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THE GEOGRAPHICAL JOURNAL

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NOTICES

LIST OF FELLOWS. Fellows are asked to notify any change of Address or Rank for the new List of Fellows, which will be corrected up to 30 September 1927 and published as soon as possible after that date.

PHOTOGRAPH ROOM. The attention of Fellows is called to the oil paintings of Central and South American Indians by Mr. A. H. Verrill, and to the water-colour sketches of Asia Minor, Syria, and 'Iraq made by Mr. Lionel Muirhead between 1868 and 1870.

THE SOCIETY'S HOUSE. The House is open on week-days from 10 a.m. to 6 p.m. The House will be closed on Monday, August 1 (Bank Holiday), and it will be necessary to close some of the rooms for a short time in July for re-decoration.

By Order of the Council,
ARTHUR R. HINKS,
Secretary.

READY.

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I. THE MAP OF THE WORLD

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Amsterdam, 1608

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Requests for full particulars of the Colonial Survey Departments, the conditions of the examination, and for the forms of application should be addressed in writing to the Private Secretary (Appointments), Colonial Office, 38, Old Queen Street, London, S.W.1.

Completed applications must reach the Private Secretary (Appointments) not later than the 31st of Aug., 1927.

Admiral
Fayon

The Geographical Journal

Vol. LXX No. 1 July 1927

GERTRUDE BELL'S JOURNEY TO HAYIL

Dr. D. G. Hogarth, C.M.G., President R.G.S.

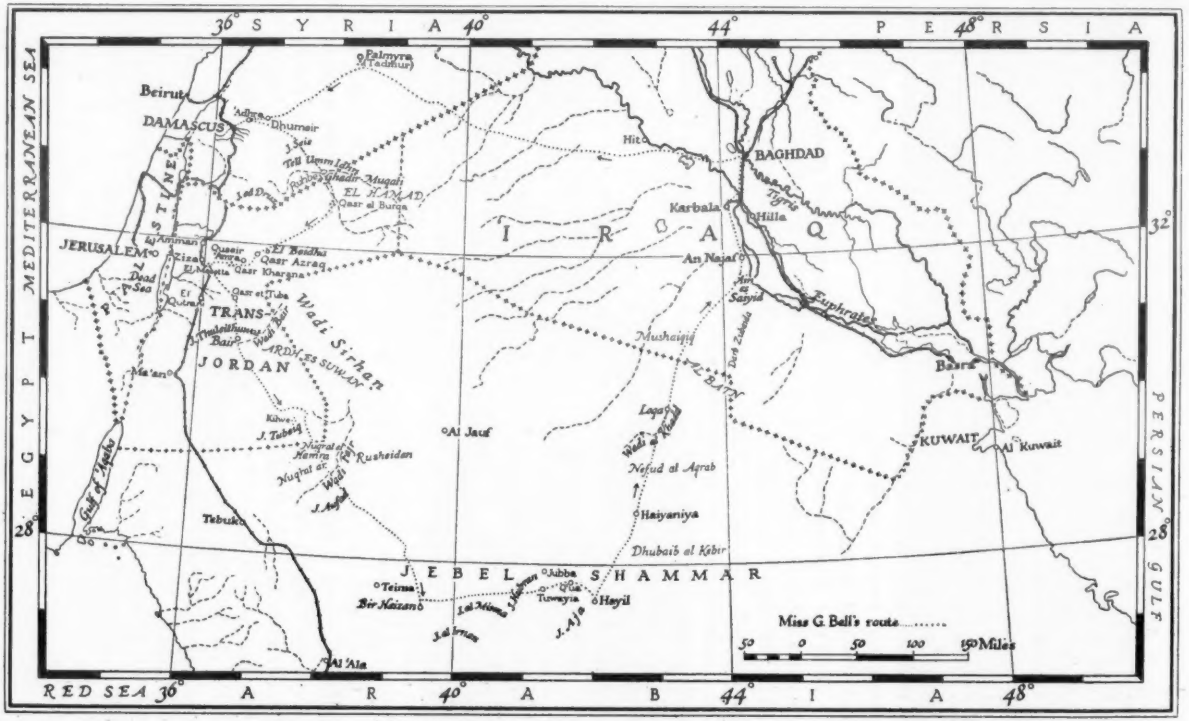
Read at the Meeting of the Society, 4 April 1927.

THIS journey was carried out in the winter of 1913–14. When Miss Bell reached England again, less than three months before the outbreak of the Great War, she was physically worn out; nor had she recovered completely when called to perform war service in Boulogne and London. She proceeded late in 1915 to Cairo and, early in 1916, to Basra; and from this moment to the day of her death, in 1926, she was engaged in exacting political work, taking few and brief holidays. It is, therefore, not surprising that she published no narrative of her journey to Hayil. When urged to write it at Baghdad she pleaded lack of time, of books, and of other facilities; but before her death, intending soon to return to England for good, she looked forward to realizing various literary projects, and among these, I have little doubt, was the composition of the desired narrative. In the meantime, she put the cartographic material which she had collected on that journey at the disposal of the War Office and the Royal Geographical Society, and her route was plotted throughout and incorporated in the "Million Map." Also during the War her social and political information was communicated to the Intelligence Services concerned with Arabia, 'Iraq, and Palestine. Taking these facts into consideration, together with the remarkable character of her single-handed achievement and its value for geographical and ethnographical science, I felt, after her death, little hesitation in asking her representatives to approve an attempt to put together, from diaries and letters and recollection of conversations, a narrative of her Arabian journey. For assurance of such approval I have to thank her father, Sir Hugh Bell, and for facilities to inspect and use documents in the possession of her family, I am beholden not only to him but also to Lady Bell and Lady Richmond.

Miss Bell arrived at Damascus on 25 November 1913, hoping to fulfil a long-cherished desire to penetrate Central Arabia and traverse Nejd to the borders of the great south desert. Since she had reason to know that such a project would not be approved either by the Ottoman

authorities or by the chief representative of Great Britain in Turkey, she avoided officials so far as possible during her three weeks' stay in Damascus, and discussed her plan only with unofficial friends and such Arabs as she thought would be both useful and discreet. These included the local agent of Ibn Rashid of Hayil, through whom she arranged to draw money on arrival at that town, and others who, like Muhammad el Bassam, the son of Doughty's 'Aneiza friend, might be supposed well informed about Central Arabia and the way thither. On such matters, however, she obtained contradictory and often unsound information, although she heard much of good authority on Arab politics and especially the activities of the Arab Unionists and the Wahhabis, which was to be of great service after the entry of Turkey into the Great War. Among other things she learned that the Desert was united for the first time since the Prophet's day—a sanguine anticipation of what would come true for a brief space three years later.

Her original plan was to slip into the Hamad desert on the east of the Damascus oasis and swing due south by such tracks as Musil had followed in 1908 and Leachman in 1912. Thus she would avoid altogether the Hejaz Railway, with its inquisitive officials and police. An illness, however, which struck down Fattuh, her indispensable Armenian body-servant, after his arrival from Aleppo, led her so to modify this plan as to render his rejoining her possible by use of the railway; and her final route was laid out in such a curve round the east of Jebel ed Druz and its eastward lava tracts (*Harrat*), as, after two or three weeks of desert marching, would bring her into touch with the railway at Ziza. She purchased twenty camels, engaged three cameleers, and sent all eastward on December 15. Following herself next day with two personal servants, one of whom was the same Muhammad Merawi who had travelled with Carruthers in 1909, she camped at 'Adhra. This place, and its larger neighbour, Dumeir, lie on the north-eastern edge of the Oasis; accordingly the Ottoman authorities seem to have supposed that Miss Bell was bound for some point in the northern Hamad or Mesopotamia, and would go by the Qaryatein–Tadmor road. But when, after delay by rain all the 17th, she entered the desert, she headed at once south of east (forward bearing 102°) for Jebel Sais, intending, after examination of the extinct volcano and early ruins reported by Oppenheim to exist there, to turn due south. Her party had been increased by a fourth cameleer and an Arab of the Ghiyadh tribe of the Jebeliya group, who was to serve as *rafiq* (guarantor) till some tribesman of the more important Beni Hasan could be procured. She was well aware that a Druse, whose people were then at peace with all the tribes which range the Safa and the Hamad immediately to east of the Jebel, would have afforded better assurance; but none could be found at the moment. The largest local Bedouin tribe, the Walad 'Ali, was reported gone east, and not likely to be in her path.

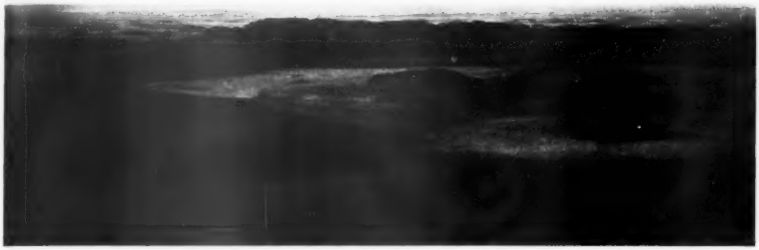


Sketch-map to illustrate Miss Gertrude Bell's Journey to Hayil

Jebel Sais was reached at noon on the 20th, the way having lain through desolate but not untrodden desert of volcanic formation on which *fellah* Arabs of Dumeir raise sparse crops. One of these was seen to sow first and plough afterwards. This tract was rendered the more inhospitable by very cold weather conditions, which coated all hilltops with snow, and at Jebel Sais itself brought down the night temperature below 20° Fahr., the tent canvas having to be thawed by fire in the morning before camp could be struck. Miss Bell found at Jebel Sais a very perfect crater and below it a two-towered fort, a mosque dating from the first century of the Hegira, a bath curiously constructed of mingled stone and brick (she wondered whence the latter could have come), and house-ruins of finely cut stone. Good well and pond water and sufficient grazing were at hand.

Next day (forward bearing about 136°) progress was resumed under the eastward face of the *harra* of Umm Idhn; and presently the party fell in with armed shepherds of the Masaid tribe, who, being at feud with the Ghiyadh, held up the party and began to plunder. In the nick of time, however, two of its members were recognized for friends; and sheikhs, coming up, called off the attack, restored the booty, and supplied a *rafiq*. Ahead lay a very repellent region. "The stony hills," wrote Miss Bell on the 22nd, "draw together in front like the gates of an abandoned Hades!"; and to add to the dreariness heavy mist and cold rain came up next day, when the large wadis Muqati and Umqad, running west to the Ruhbe marsh, had to be crossed. But Burqu was duly reached on the 24th, and Miss Bell camped there over Christmas Day, taking several latitude observations (32° 37′ 19″ N.), and finding extensive ruins to study and measure and inscriptions, Greek, Safaitic, and Kufic (one being of the Umaiyad Caliph, Walid) to copy. The fort, she concluded, had indeed seen a Roman occupation, far though it lies beyond the eastern limit of Provincia Arabia.

On the 26th she breakfasted in a temperature of 25° Fahr., and then followed across a *harra* patch the trace of an ancient road (bearing about 230°) which led down the Wadi Resaya towards Qasr el Azraq. On the 28th she sighted the southern end of Jebel ed Druz and reached camping-grounds and dry wells of the Ruwalla 'Anaza, a great tribe of the Hamad, whose headquarters lie some three days to the east. They come thus far to westward only when at full strength. She actually encountered, however, not those tribesmen but their sworn foes, the Serdiya, a branch of the large Beni Sakhr group, and was hospitably entertained by their sheikh, Ghalib ibn Mit'ab, famous (or infamous) in the Arab world for having betrayed the paramount Ruwalla chief, Nuri Sha'lan, to the Turks. On the 30th, after hearing the women wail at the cenotaph of Mit'ab, she emerged at last from the volcanic country, crossed the main track between Jebel ed Druz and Wadi Sirhan, and reached the Roman fort and springs of Baida, from which place to Qasr



The crater of Jebel Sais

The Hammam, Jebel Sais

Pinnacles of volcanic rock (Harra)

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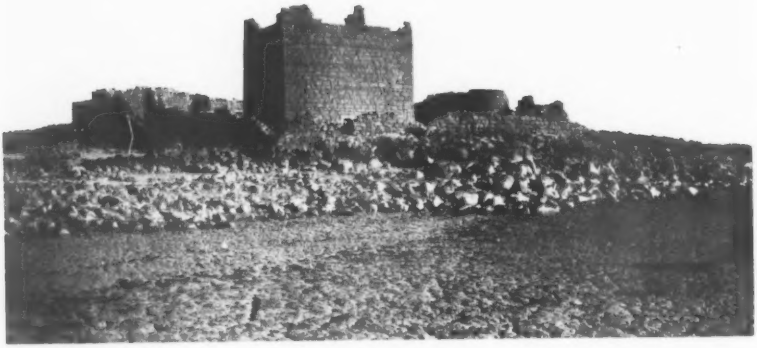

The keep of Burqu

The castle of Bayir

Qasr el 'Amra

el Azraq there remained but a short ride, on the last day of the year. We need not linger with her there (lat. 31° 49′ 4″ N.), for this large castle, whose existing ruins, though they contain an inscription of Diocletian, are of the period of the Egyptian Mamluks, has been well described, together with its palm grove and reedy pools. The place became famous, in 1918, as the rendezvous or rallying-point of the Emir Feisal's force which afterwards took Damascus. Lawrence spent many days of that winter and spring in its ruinous keep. Miss Bell found it, as usual, in the hands of outlaws, and experienced some difficulty. It has since harboured Druse refugees.

She was now on a doubtful frontier between the range of greater tribes. Certain graveyards of the Ruwalla, who had used fragments of Byzantine and Umaiyad architecture for headstones, and some horsekeepers of the Sherarat, who, as landless men without feuds, frequent frontiers, were met with on January 2 as she moved down towards the well-known ruins of Qasr el 'Amra, Kharana, and Meshetta—the last a "ghost," stripped of the lacework façade which adorns a room in the Kaiser Friedrich Museum at Berlin. There she was well within the range of the Beni Sakhr, the Ruwalla's chief foes. At Kharana, less well known than Meshetta, but dating in part from the first century A.H. full of Kufic texts and, as she wrote, "splendid surprises," she camped and worked for two whole days, postponing her appearance in the neighbourhood of the railway till January 7.

This first stage, completed in twenty-one days had, she confessed, tried both her body and her soul. Continuous cold and the absence of Fattuh, who knew her ways, made for acute discomfort; and this had been aggravated by the uncertainties of passage through the ranges of small and lawless tribes. To make matters worse, it looked for some days as if that trial had been endured in vain; for, though Fattuh duly joined her at Ziza, there followed on his heels a sergeant and posse of soldiers, sent to stop her further journeying in the desert and bring her to 'Amman. Ten weary days, therefore, had to be spent in interviewing officials (the *Kaimmakam* of Salt, fortunately for her, was a Christian), in telegraphing to Damascus, and in waiting—too familiar process!—for the Turkish official will to weaken. A powerful local Christian family, the Bsharras of Judeida, befriended her; and returning to Ziza on the 14th, she was able to persuade the chief of police to accept a document absolving the Ottoman Government from further responsibility for her fate. That same day also she received a message from her friend, Sir Louis Mallet, H.M. Ambassador at Constantinople, warning her that the British Government would likewise disclaim responsibility if she persisted in the way to Nejd. The thought that she was about to re-enter the desert (it "always looks terrifying from without," she wrote) as an outlaw threw her for a few hours into deep despondency; but reflection followed that, after all, in no case could either Government, Ottoman or

British, do anything to protect her in that desert; nor could it, if she came to grief, take measures that would give the smallest satisfaction to any one. Eventually, though she failed to induce the police officer to return her document, and her three 'Aqail camelcers refused to continue, she slipped away on the 17th, in good spirits, with help and fresh men from the Bsharras, and rode south-east over recently tilled lands of the Beni Sakhr for Tuba, a small Umaiyad palace visited and planned by Musil. This place, which lies within the drainage basin of Wadi Sirhan, is known as the "gate of the 'Anaza," being on the line between the *dira's* of the Beni Sakhr and the Ruwalla. On the 19th the party descended the Wadi Mukhaiwir, and reached the black and dreary Ard es Suwan (Land of Flints). Here three pointed and white-capped hillocks, known as the Thuleithuwat, make a conspicuous landmark. She passed close to them but on the west, not the east side from which Carruthers, on his outward ride from Qatrani, had seen them in 1909. Crossing several tributaries of the Wadi Bayir, the party dropped, on the 21st, into the main valley which contains much tamarisk scrub, several wells, and the ruin which Carruthers saw on his return journey. He guessed it to have been a caravanserai on a Roman trade-route to the Persian Gulf, but Miss Bell thought it an early Islamic castle like Tuba, and the last that the desert-loving Caliphs of Damascus had pushed out into the Syrian waste. Lawrence, however, who visited it more than once in 1917, believes it to date back to the Ghassanids. As the first halting-place of importance on the path to Arabia, Miss Bell thought well to fix its latitude at 30° 40′ 43″ N.*

Thenceforward, until she entered the Nefud, three weeks later, Miss Bell, unlike her predecessors, Guarmani in 1864 and Carruthers in 1909 (their tracks ran respectively to east and to west of hers almost to Tor at Tubaiq, and both to westward of hers south of that point) was enabled, by the certainty of finding *khabra's* (ponds) after recent heavy rains, to avoid the dangerous proximity of wells, which too often are rendezvous of raiding parties. Bayir itself is such a rendezvous, but less in winter than in summer, when the Beni Sakhr frequent it. Though it is the resting-place of this tribe's *jidd* (tribal forefather), it lies near the limit of its southward and eastward range and is apt to be occupied from time to time by its enemies. At all seasons, indeed, the tract of desert north and south of Bayir is dangerous, and especially so when (as at the moment of Miss Bell's passage) it is *khala*, *i.e.* empty of shepherds. Moreover, it is of a melancholy monotony. No outstanding feature relieves a dreary succession of shallow sandy wadis, declining towards the Sirhan, and of dusty, flinty levels between them. Over this waste

* Miss Bell carried a 3-inch transit theodolite, in whose use she had been instructed at the R.G.S. Judged by a subsequent observation at Hayil, which, when computed, agreed within 42″ with another obtained by Charles Huber, her latitudes may be relied upon.

the party zigzagged from *khabra* to *khabra*, not keeping on one course, as travellers do between wells whose position is fixed and known, but seeking rain-waters which might have collected and remained unexhausted.

On the 25th came a change. The party was approaching the northern verge of Tor at Tubaiq, the Itbaik of Carruthers and Tobeyk of Doughty (who knew it by report alone)—a knot of hills to which Bedouins resort all the year round for pasturage. Here the sandstone has been protected from denudation by a lava-cap, now largely wasted and lying in the form of great boulders on the valley-floors. Smoke was seen, a portent of terror in so silent and vacant a land; but it heralded nothing worse than a camp of Howeitat shepherds, who reported that many of their great tribe, of both the Tayi and the Jazi sections, were pasturing in the hills ahead. Reassured, Miss Bell rode on over ground covered with green plants and starred with little flowers, white, purple, and yellow, and up between broken hills into the heart of the Tubaiq, which she describes as "rusty red hills with a dropping of coal-black stones down their steep sides" and with sands, at first red and then yellow, on their valley-floors. She found it a real hill region where dews, not met with since the Jordan valley, soaked her tent-flies, and frost sparkled at dawn. The most important chief, 'Auda abu Tayi, was away raiding the Shammar; but she was well received on the second day by another sheikh, Harb ad Darausha, at whose tent in the evening arrived 'Auda's cousin, Muhammad adh Dhailan, who was "sheikh ad Daula" *i.e.* agent for the collection of camel-tax for the Ottoman Government and responsible for the safety of a section of the distant Hejaz Railway.

Miss Bell was disturbed to find that even here she was not quite beyond reach of the Ottoman arm, and to hear her men questioned whether she was or was not travelling with the leave of the "Daula." But no harm followed, and in the end she spent no less than eight days in and about the Tubaiq, of which "very interesting region," as Carruthers called it, her diary gives the best account we have. The keen-eyed Howeitat—Doughty's "stout nomad nation" which he guessed to be of Nabathæan descent—seem to have pleased her. The time was passed partly in the hospitable tents of Harb and Muhammad, she being, as she said, "baptized of the desert" in the camel's milk of the Tayi; partly in taking, without let or hindrance, many photographs and a latitude observation (this worked out at 29° 52′ 53″ N.); partly in excursions to two neighbouring ruins; partly in climbing heights from which she could "look over fold on fold of golden red sand and smoke-grey ridge"; and always in making and re-making plans for the journey ahead. After long debate between the Jauf and the Taima routes, she elected the first, being warned that the Bishr, Hutaim, Fejr, Wad Suleiman, and others ceaselessly raid the second; and with Harb's brother, Awwad, as *rafiq*, she actually made a start ahead on January 28. But next day came news that the Wadi Sirhan, by which she must pass, was full of Ruwalla tents, among which

Awwad might neither go safely nor frank his charge. So she turned back after calling on the *harim* of 'Auda, who told her of the " burden of woman " in nomad life ; and she abode other four days with Muhammad adh Dhailan, beguiling part of the time with an excursion to the walled pool of Kilwa, where are a small stone cistern of uncertain date and a sacred High Place. This ride took her beyond the Tubaiq which she saw, on the south, " break down abruptly in great riven crags " to a plain of red sand spotted with vegetation and diversified by rain-pools, left over from the downpouring of November. Meanwhile she had been advised so strongly to give Taima a wide berth (Carruthers had had to fly thence in 1909) that, when finally she started south on February 2, she intended to try to reach Hayil by the directest line that the Nefud desert would allow, *i.e.* by cutting across its south-western angle, where she heard of two wells—Haizan and Thoza—and of dunes less high and intervening horseshoe hollows less deep than they become farther east.

Besides a Howeiti *rafiq* her caravan now included two starveling families of Shammar folk with tents, children, and livestock. Though mendicant and graceless, they were welcome as unofficial *rafiqs* in the event of encounter with Shammar elements ahead. All went well for four marches slightly east of southward over steppes of sandstone and gravel cut by deep wadis falling east. " I read 'Richard Feverel,'" she noted on the first afternoon. The next day was beguiled by legends of the Tubaiq, and the next again by the red-gold sands and grey-green trees of the Nuqra depression. On the seventh day her march lay over a " regular garden " of flowers in the Aufad. But on the eighth came a check. After a party of Howeitat on the move had been passed, a camp of the Wad Suleiman (these nomads are Jeda'n of the 'Anaza group, and range to Tebuk and Taima) was seen ; and its sheikh, Saiya ibn Murted, barred passage unless Miss Bell would surrender a revolver and a Zeiss binocular to his greed. Even with these in his hands, he tried to induce her *rafiq*, by a promise of half the plunder, to abet a plot for leaving her to his mercy ; but, finding the Howeiti steadfast, he dared not provoke a great tribe, and in the end let the party go next day, with his own cousin and two men of the Fuqara—a tribe which befriended Doughty—for *rafiqs*.

On the third day—the eighth from Tubaiq—the first red dunes of the Nefud showed abreast ; and on the morrow, at a point only one long camel-march from Taima, the pebbly steppe was left for the sands. The pale yellow dunes, lying east and west with steep sides to north, were bare, but the lower sand was found well clothed with camel food. The change from the monotony of the steppe to a winding course, keeping a general direction south by east, round or through *qu'ara* (steep hollows between dunes), seemed pleasant enough. But in the absence of rain the going was heavy, and the weather continued cold. On February 13 the sands were white with frost. Many shepherds of the 'Awaji group were met, who had news that the Rashid Emir ex-

The defile of Habrun

Su'ud in Abu Tayi's tent

Auda abu Tayi's harim

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Drawing water at Haizan well

Jebel Aja

pected the *sitt* (lady), but was himself, at the moment, far from Hayil, raiding in the northern Nefud. On the 14th Miss Bell reached Haizan, where many of those shepherds were watering from a brackish well, evidently of great antiquity, to judge by its cemented upper part, and its depth (150 feet) into rock. A sweeter well near by, called Haiyar, had lately been blocked. Jebel 'Irnan in Nejd had been visible for two days past; and now from dune-crests some bearings on its northern butt, called Dhurru, were obtained to south-south-east, and others on Jebel Misma almost due east.

Next day the other reported well, Thoza, was passed. On the 17th, to the general delight, heavy rain fell, and hardened the sand for that day and the following. Gravel was near at hand on the south, but fear of raiding Hutaim—reckoned, like the Sherarat, landless men of tainted blood—and consideration of pasture moved the guide to keep within the shelter of the Nefud. The party wound among dunes and horseshoe hollows at a rate of not more than one crow-fly mile an hour, and Miss Bell began to grow as tired of the sands as she had been glad to get into them. Though, as she writes, she "brought the world back into perspective" by reading Hamlet in the rain, she decided, on the 19th, to bear right-handed to harder ground, and so she came to the southernmost dunes, and between the black rocks of Misma at last saw Nejd.

"It was a landscape terrifying in its desolation. Misma drops in precipices of sandstone weathered to a rusty black, and at its feet are gathered endless companies of sandstone pinnacles, black too, shouldering one on the other. They look like the skeleton of a vast city planted on a sandstone and sand-strewn floor. And beyond and beyond more pallid lifeless plain and more great crags of sandstone mountains rising abruptly out of it. Over it all a bitter wind whipped the cloud shadows. 'Subhan Allah!' (said one of her servants), 'we have come to Jehannum!'"

That plain, however, proved by no means infernal. Pasture and waterpools lurked among its sand-pillars and tables; and for that day and the next it provided fair going. Then a southward tongue of the Nefud projected far across the path, and the party, now bearing almost due east, had to wind again among dunes. The defile of Habrun was passed late on the 21st, the soil became granitic, the long ridge of Jebel Aja showed ahead, and a mud-built village, Tuwaiya, the first seen since Ziza, invited the party to stay after sending out five riflemen to investigate it. The course henceforward lay but little to north of that followed by Doughty on his ride eastwards from Taima in 1877. Presently for the third time intervened dunes, from which there was no escape till, on the 23rd, the deeply worn track from Jubba and Jauf was struck. Following this past the village of Qana with its palm gardens and cornfields into a sandy pass walled with black pinnacles, Miss Bell came through Jebel Aja down to red plains which support villages, mud-walled and palm-girt; and on the 25th, entering

a basin larger than the rest, she saw Hayil. Well knowing the unwisdom of taking such a place by surprise, she had sent two men ahead at dawn. No European, other than a Turkish officer, was known to have been seen in Hayil for over twenty years, and no European woman for more than thirty. The all-powerful Emir, Muhammad ibn Rashid, who protected more than one Western visitor, had died half a generation ago; and since his death murder after murder had thinned the princely house. Its power had been waning for some time in comparison with that of the Emirate of Southern Nejd; and one result of the growing preponderance of the Ibn Sa'uds in Central Arabia was likely to be accentuation of Wahhabism heretofore lukewarm. Miss Bell might well be doubtful how she would be received.

All however seemed to promise fair. The envoys were met returning to say that the party was welcome, and Miss Bell was guided in a half-circuit round the town wall with its machicolated brick towers and admitted by the south, or Qasim, gate. But, to her disappointment, she was directed to quarters allotted to her immediately on the left, in what had been a subsidiary palace of the great Emir Muhammad, and since his day used as a guest-house. An inclined way, open on one side, led to a roof court and a lofty *roshan*, or reception-hall, whose floor was spread with carpets and its divan with cushions, below a red and blue frieze of pious texts. A ladder to the roof tempted her to view the town; but, beyond the knowledge that her house stood within a large fivefold enclosure, which once had bloomed with gardens and cornfields but was now uncultivated, and that other gardens and fields occupied a large part of the town area, she gained little before being called down to receive two women told off to attend her. Of these a lively Circassian, once sent by the Sultan 'Abdul Hamid for a concubine to Muhammad ibn Rashid and now married, took her fancy. This woman's mission no doubt included espionage; but her reports, in the end, did Miss Bell some service, and she seems to have reciprocated the latter's liking. The Emir, Sa'ud ibn Rashid, proved indeed to be absent, and the town was nominally in charge of his uncle, Ibrahim as Subhan, but really in that of Fatima, the Emir's grandmother, the real power behind the throne. Presently an odour of attar of roses heralded the entry of Ibrahim himself, and a polite conversation about former European visitors, especially the Blunts and Doughty (under his Arab name, Khalil), and about the stormy history and present state of the Rashids, left Miss Bell with no nearer prospect either of cashing the draft for £200 which she had brought from the Rashidian agent in Damascus, or of penetrating farther into the town. In fact, Ibrahim warned her that the *ulema* disliked her presence, and next day a message enjoined her not to leave the house without express invitation. On the 27th, however, she was bidden after nightfall by Ibrahim to the Qasr or palace, and conducted thither through clean silent streets, empty but for a woman or

two creeping under the wall. The way lay through the market-place, which was entered by a wooden gate, and past the columned façade of the chief mosque to a second and then a third barred gate. These passed, she found herself in the Qasr and was led to the main reception hall, white of walls and of floor, below a high roof propped by stone pillars. The usual courtesies were exchanged, and she handed over the presents which she had brought.

But on March 1, the fourth day of her stay, she had seriously to consider her position. She was told that neither would permission to depart be given nor would her draft be honoured till the Emir should return at some unknown date. She had sold six of her weaker camels, and with their price held just £40 in hand. A request for an audience of Fatima was not answered, and the presents left overnight at the Qasr were returned. She could only sit and wonder what the dark minds of the Rashids might be meditating, the Rashids, on their side, evidently being equally at a loss to tell what was in hers. In Hayil she knew murder to be "like the spilling of milk," and no prominent head to rest easy on its shoulders. "To the spiritual sense," she writes in her diary, "the place smells of blood." The political situation in Nejd, she had learned, was as unfavourable to her plan of going south as it well could be. Rashid power was everywhere on the wane. In the north Nuri Sha'lan held Jauf in secure defiance, and in the south Ibn Sa'ud was mobilizing for an anti-Rashid campaign destined to materialize toward the end of the year. Contrary to much that she had heard in Damascus, North Arabia was full of war and rumour of war.

Therefore she came, either now or earlier, to the conclusion that it was useless to attempt to reach Southern Nejd, and formed a new plan for direct return to Baghdad with eight camels, while the rest, with her spare men, should take the road for Medina and regain Damascus by the railway. Exactly when she began to doubt of her original plan is not clear, nor does the question matter, except in so far as it affects another which puzzled and worried herself—why she was not more frankly welcomed at Hayil. During her first two days, at any rate, she seems still to have cherished hope of reaching Ibn Sa'ud; and, if so, she probably gave some hint of it to Ibrahim, even if she did not directly ask for permission. At any rate, it may be inferred from Fatima's remark, "Is that all?" made a week later than this to the Circassian Turkiya, when the latter convinced her at last that it was for Baghdad, not Riyadh, that Miss Bell wanted a *rafiq* and money, and also from that old queen's action in forthwith cashing the draft, that previously the latter had seen reason to think that the Englishwoman intended to proceed in some less acceptable direction. At this juncture the Rashids, menaced by Ibn Sa'ud, and anxious, as always, to stand well with the Ottoman Government, whose forces their enemy had just expelled from Hasa, could hardly help an Englishwoman to take her money, her prestige, and her

knowledge into the Southern Emirate ; and seeing that they had received forenews of Miss Bell's coming, they probably knew also that she had come without Turkish sanction.

A significant passage in her diary for the 28th reflects disillusionment about the utility, if not the practicability, of travelling in independent Arabia *à la franca*, as she called it, *i.e.* as a European notable without assumption of Arab character, but with train of servants and private tent, equipped with travelling comforts of the West. Thus Shakespear had gone to South Nejd, as she knew, but not Palgrave, Doughty, or Leachman. She questioned if it were at all worth while to travel like the first named. Doughty, at the price, it is true, of pain and ignominy, had succeeded in seeing all Hayil and much of its intimate life. What could she add to his picture, penned, as she was, like a plague-stricken patient, within an implacable cordon ? She seems keenly to have felt a sense of isolation even before she reached Hayil, and during all the time that she spent in the town, an unwelcome consciousness of being alien and incongruous. "I was the one blot," she wrote, after describing the company gathered about the Emir's mother, Mudi, when audience of the *harim* in the Qasr had at last been granted. On all her previous journeys in the Near East, and especially among the Bedouins of the desert, Miss Bell had never failed herself to control her actions and those of her men, to disarm suspicion and to establish reasonable relations with whoever was in authority. Now her failure in all these respects galled her not less than did the inactivity enforced, day after day, on her energetic body, and her disappointment at having come so far to see so little. She wrote bitterly now and later of her "imprisonment" in Hayil.

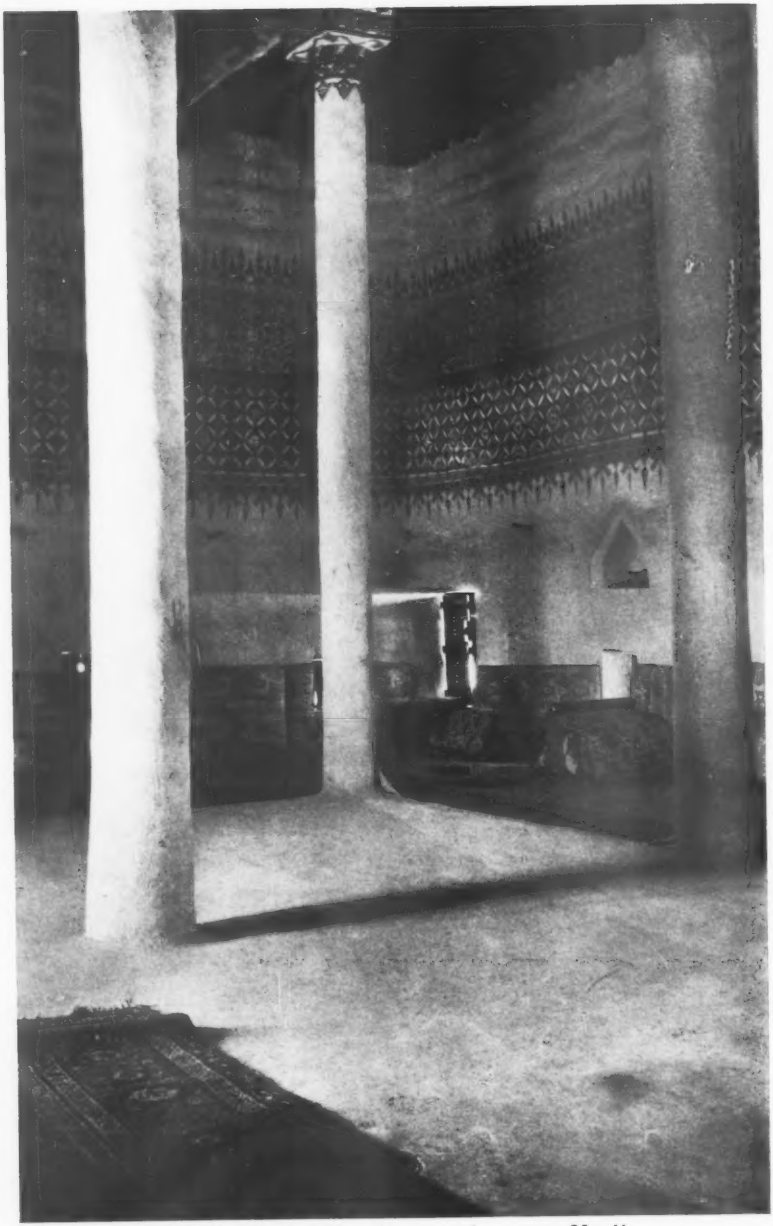
It should be said on the other side, however, that while she was treated there from first to last as a great lady, with formal and even distinguished courtesy, her arrival in a Wahhabi town placed its rulers in a difficult position. No one of its existing generation had seen a Christian woman of this station before. Why this one had come and whither she meant to go were questions that were bound to be canvassed suspiciously. The princely house, none too safe or sure of itself, evidently felt her a grave responsibility. Had Miss Bell's nerves been as well under control as in her younger days (she was now forty-four, and showed clearly in her diary that, from the start of this journey, she was neither physically nor morally as fit for the road as once she had been), she might have allowed more for peculiar circumstances of the moment, social and political, governing the action of the Rashids in Hayil.

That visit to the Emir's ladies on March 5 was almost the only occasion, before the sky cleared on March 7, which offered her any further opportunity of seeing the life of Hayil. Except for one angry conversation with Ibrahim in the Barzan, on the 2nd, and an excursion outside the walls to his garden, she had to keep for nearly a week after the 28th to

Villages near Hayil

Hayil from the north-west

The Suq and Mosque of Hayil



The Roshan in the guest-house at Hayil

her house or its precincts, protesting to all and sundry and waiting for the camels which she had called back from their distant grazing-ground on the Nefud. The audience with Mudi, still young and attractive, though three Emirs, one after another, reeking of the blood of her husband or her son, had forced her into their beds, stirred all Miss Bell's sense of the strangeness of the place with its silent moonlit streets and blood-stained society—" the unadulterated East in its habit as it has lived for centuries." She received a visit from two princely children, and returned it to find herself confronted in a garden by five small cousins, scented, solemn and silent in stiff gold-embroidered robes, who stared at her with painted eyes.

Whether these visits broke the ice, or the accomplished fact of the division of her caravan added conviction to Turkiya's pleading, certain it is that late next day Fatima did open the Treasury, and Miss Bell did find herself free to go. But, greatly daring, she refused after all to budge unless allowed a sight of town and Qasr by daylight—a sight which Mudi had told her she might on no pretext enjoy till the Emir's return. On the 7th, however, this facility was accorded. Crowds beset the path, but none molested her. The Hayil zealots, whether spontaneously or under compulsion, were all smiles and benevolence, vying with one another to supply subjects for the Englishwoman's camera ; and she was conducted all over the Qasr, even to the kitchen.

Relieved of her late anxieties and cheered by serene weather, Miss Bell ended with a more kindly feeling towards Hayil. " In spite of imprisonment," she wrote, " I carry away a deep impression of the beauty and charm of it all." The sunset glow on Qasr and town ; the art of the palace gate ; the noiselessness and, strange to say, dustlessness of the clean streets ; the green of cornfields " shining like jewels within the walls " ; the atmosphere of Harun ar Rashid's Arabia—all these things brought balm, and coloured the descriptions which she would give to her friends after her return to England.

If northwards she must go, she desired to follow the Persian Pilgrim track along which over a thousand years before Queen Zubaida ordered wells and tanks to be provided. Not that these attracted her, but she had heard of " written stones " near Dhubaib, some two marches from Hayil. On the 8th, however, she learned that, on the double pretext of the insecurity of the Darb Zubaida and of her obligation to meet the Emir, her guide had been ordered to lead by a more westerly track to the Haiyaniya well, and thence as straight as might be to Najaf. She could only bow. But in the end her disappointment about Dhubaib, was to prove short-lived ; on the second day out, she heard enough of its stones to recognize natural freaks or fossiliferous blocks, rather than cuneiform *stelæ*. Two days she rode east of north over the plain to a low sandstone ridge which marks the limit of Jebel Shammar, and then once more into the Nefud by a deep-worn track between daisy-

starred dunes smaller than those of the west. Everywhere were to be seen abundant pastures and Shammar shepherds' tents. Two days up to Haiyaniya—where water was drawn from 150 feet depth before a castle built by the Emir 'Abdullah ibn Rashid in the middle of the nineteenth century—and two days beyond it the land was still sandy, and known as Nefud el 'Aqrab; but it soon changed to a gravelly steppe—a type of desert usually called Dahna—and, after the bush-grown Wadi el Khadd had been passed, to flat and stony levels. "Oh, but it's a long and weary way!" sighed Miss Bell, as soon as the hills of Jebel Shammar dipped below the southern horizon; and her one solace was found in steadily mapping a track which, except at Haiyaniya, diverged from any followed by previous explorers. At Loqa, on the 15th, were found wells; but for the most part the camels drank from rain-pools. At Haiyaniya Miss Bell had been told that the Emir had passed eastwards. Now it leaked out that his raid on Jauf had failed. All idea, therefore, of meeting him was abandoned.

On the 17th, in a low sandy tract called here (as on the Kuwait road) Batn (Belly), the limit of the Shammar country was left behind, and with it the careless security of the past nine days. The track, bearing now slightly east of north and converging towards the Euphratean borderlands, brought the party within the extreme range of small semi-settled tribes—Arab but not Bedouin—which, in search of spring pasturage, resume nomadic habits. This year, owing to the favourable rains of the past winter, they were pushing farther afield than usual. The first two groups met with—one of Ri'u tents and one of the Beni Hasan—were ready to loot the caravan, and only refrained from fear of the Shammar. A third group belonged to another small and ignoble tribe, the Beni Salama. Much nervous energy and time were spent in persuading each of these groups to find *rafiqs*, whose guarantee would serve for a few hours only and be doubtfully valid with the next group that might be met; and great was Miss Bell's relief on the 19th, after the usual tentative approach to a fourth camp surrounded by great numbers of grazing donkeys, to find it occupied by Ghazalat, a tribe of such repute and strength that robbers (more and more likely to be met as Najaf drew nearer) would be slow to ignore its safe conduct. The worth of the Ghazali *rafiq*, Dawi, was to be proved next day and the day after, when, deaf to bribes, he stood by his charge and twice stopped attempts by Madan tribesmen to loot. The track had now fallen into the high-road, the Darb Zubaida, and what with camel-herdsmen, who shot by way of precaution, and Najaf merchants, who shot from nervousness, the rest of the way did not lack incident. As the margin of cultivation drew nearer, grassy *wadis* set with sparse trees were met with. Najaf could have been reached on the 22nd had not Miss Bell set her heart on holding on to and camping at a historic spot, 'Ain as Saiyid, which was once called Qarqisiya. Its castle however proving of recent date, and

the place being without other interest than its associations, Miss Bell rode on to within sight of Najaf, camped near a village two hours away, and on the 23rd coaxed her camels across irrigation channels and rotten canal bridges into the town.

We need not follow her further travelling by carriage to Karbala and Baghdad over well-trodden ways ; and I shall not attempt to relate her return across the Hamad to Damascus, after she had spent some three weeks in Baghdad. To another European woman, in the days before desert motor services had been thought of, such a journey would have seemed adventurous enough. But to Miss Bell, who had been into Nejd, a crossing of the Hamad, though it offered hardships and some danger, and the chance of visiting one of the greatest of Bedouin chiefs—Fahd ibn Hadhdhal—at his camp in the broad Ghara depression, and also of seeing and studying many unrecorded ruins of early Islamic and even pre-Islamic times, seemed something of an anti-climax.

She was now very tired and lacked her old zest for the novelties of exploration. A fit of depression at Baghdad issued in self-reproach for her failure to go beyond Hayil, or, as she thought, to render services to science commensurate with the labour and risks of her journey. She had learned, for one thing, that her pet study, archæology, would find little to feed upon in Central Arabia. But this mood did not prevent her from registering then and there a vow to ride direct to Ibn Sa'ud at some future date—a date which, in the event, the Great War was to postpone for ever.

Of her journey she felt in Baghdad indisposed to write; but she admitted that after a while she might feel differently. Such change of feeling did, indeed, come to pass. Had she, however, lived to write her own narrative, she would have claimed less for her achievement than here and now I propose to claim. To my thinking its interest and value lie by no means only or principally in its mere demonstration that a Christian Englishwoman could penetrate Nejd alone and return unscathed, but more in all sorts of gains that accrued to the geographical and archæological sciences, and to our social and political knowledge of the Arabs. Her journey in its first stage from the Oasis of Damascus round the back of the Syrian *harra*, was a pioneer venture, which not only put on the map a line of wells, before unplaced or unknown, and enabled account to be taken during the War of the strength and local ranges of the Jebeliya tribes, heretofore names in the void, but also cast much new light on the history of the Syrian desert frontiers under Roman, Palmyrene, and Umaiyad domination. It is to be hoped that Miss Bell's detailed notes on the ruins marking these frontiers may be made available for students of history and architecture. On the second stage from Ziza to Hayil, archæology gained less (since nothing ancient of importance was met with after Bayir), but geography gained more. Miss Bell gives in her diary much the best account that we have to date both of the steppeland

forming the western half of the Sirhan basin and also of the isolated hill group of Tor at Tubaiq. She was the first European to find a way across the south-western angle of the Nefud and to prove the existence of wells there; the first, too, to discover the character of the denuded sandstone region of north-western Jebel Shammar, which escaped Doughty. But perhaps the most valuable result of that stage consists in the mass of information that she accumulated about the tribal elements ranging between the Hejaz Railway on the one flank and the Sirhan and Nefud on the other, particularly about the Howeitat group, of which Lawrence, relying on her reports, made signal use in the Arab campaigns of 1917 and 1918. There is more to be learned of Bedouin life, thought, and custom from this part of Miss Bell's diary than in any book except Doughty's 'Arabia Deserta.' It is especially informing on the subject of the women, of whom her sex enabled her to see more than her predecessors.

Her stay in Hayil was fruitful, not of fresh topographical matter—for the place had been well described a generation before and had not materially changed—but of political information, especially concerning both the recent history and the actual state of the Rashid house, and also its present and probable relations with the rival power of the Ibn Sa'uds. Her information proved of great value during the War, when Hayil had ranged itself with the enemy and was menacing our Euphratean flank. Miss Bell became, from 1915 onwards, the interpreter of all reports received from Central Arabia.

The final stage of her journey—the ride from Hayil to Baghdad—had less important results. Though her route was new to geographical science, and therefore has been of much interest to cartographers, trying to plot the wadis running eastward towards the Shatt by their occurrence on different north–south tracks, it proved singularly poor in scenic and social features. Moreover travellers over other tracks lying not far from it on either hand had informed us already about the general character of this eastern end of the Nefud, and of the Dahna and the Shamiya steppes. Indeed, whether for topography or for social anthropology and ethnology or, needless to add, for archæology, the entries in Miss Bell's subsequent diary kept between Baghdad and Damascus are more valuable than those made between Hayil and Baghdad. But what she had learned about the Shi'a tribes of the Euphratean fringe was to prove of much service in the War and after.

It remains to be said that, in addition to half a dozen latitude observations, Miss Bell took her bearings and kept her marching times, also daily readings of barometer and thermometer, without a break from one end of this journey to the other. These bearings and readings she noted and recorded in such workmanlike fashion that little difficulty was found in plotting her continuous route from and back to Damascus—a total march of about 1500 miles.

The jaded traveller, writing her diary and letters at Baghdad in April 1914, had no suspicion that, in little more than half a year, the knowledge and experience acquired during the past four months, which seemed to her then so little important, would become of national value. Nor could she foresee that, even after the War, Northern Nejd would return to the obscurity from which she had rescued it. Up to this year of grace, 1927, her visit to Hayil, thirteen years ago, remains the last that has been put on scientific record by a European traveller.

Before the paper the PRESIDENT said: I have no one to call upon to-night but myself, and I shall spare you any effort at self-introduction. But may I say a few words by way of introduction to my discourse? You will understand, without my impressing it upon you, from the circumstances of this paper, that I am speaking of what I have not myself seen; and that I am entirely dependent for what I am to say to-night upon the notebooks and diaries of Miss Gertrude Bell, written in the desert under every conceivable circumstance of difficulty and in every sort of weather. They contain mere *memoria technica* which her remarkable visual memory and mind richly stored with the experiences of the desert and of the desert men would have been able to clothe with flesh. I cannot clothe them with anything like the same flesh, and I hope you will not expect much more than the bare bones of an itinerary.

Dr. Hogarth then read the paper printed above, and a discussion followed.

Sir PERCY COX: Dr. Hogarth, when he commenced the paper, told us how difficult he found it to do more than give us the dry bones of Miss Bell's narrative. We all know that with her great command of English and her powers of description what an absorbing narrative she would have given us; but as Providence did not spare her to tell her own story I think we are greatly to be congratulated on the material having been given to the hands of Dr. Hogarth. Apart from the fact that he is President of our Society and our great authority on Arabia in general, he was a close friend of Miss Bell's, and always in touch and in sympathy with her work and her ideals. We can all admire the extraordinary pluck and tenacity with which she went through this lonesome journey. It is a very great pity that none of our Arabian travellers are in England now, or with us to-night, who could have entered into the details of her narrative and commented upon its great value in many respects. Arabian exploration, indeed, seems to have a rather fitful history. The end of the 'seventies and the beginning of the 'eighties was the period which saw the great expeditions of Doughty, the Blunts and Huber. After that there came a lull for a number of years, and it was not until the early years of this century that English interest seemed to have revived. I cannot help thinking that the revival was in a great measure due to the extraordinary amount of interest taken in that sphere and in the Persian Gulf by Lord Curzon during the seven years of his Viceroyalty in India. I cannot say whether Miss Bell first got her inspiration from that source, but, at any rate, I know that some of her contemporaries did—for instance, Captain Shakespear and Captain Leachman, who had both made fine expeditions into Central Arabia. Unfortunately, they were both killed in the war, or they would, I am sure, have gone back to the field of their early expeditions.

Miss Bell's journey, of which we have heard such a graphic story from Dr. Hogarth, was the beginning of my acquaintance with her, in this way.

In 1909 I was home for a few months' leave from the Persian Gulf Residency. Sir Richmond Ritchie, a mutual friend of ours, arranged a meeting between Miss Bell and myself that she might consult me as to the possibility of penetrating Central Arabia from the Persian Gulf side. At that time politics among the tribal chiefs between the east of the Persian Gulf coast and Hayil were extraordinarily disturbed, and I was obliged to persuade her to postpone her project for penetrating from that side to a later date. That was in the winter of 1909. She went almost immediately to Asia Minor, and it was then that, finding herself unable to get southward, she made the journey from Aleppo to Baghdad, returning through Northern Mesopotamia to Konia, of which she gave an account on her return in a very fine book of travel, 'Amurath to Amurath.' After that she was unable to find any opportunity to realize her ambition until just before the war, in 1913, when she found herself in Damascus in November, and managed to slip away in the manner that Dr. Hogarth has described to us to-night.

Then Dr. Hogarth told us how, after this journey, she came home tired out and had barely had time to recuperate when came the outbreak of the Great War, and from that moment she was continually employed on Government service. In 1915 she went to Cairo, where she became a member of the Intelligence Bureau for Arab Affairs, and where she was associated with Dr. Hogarth (then Commander Hogarth, R.N.V.R.), as well as with Sir Gilbert Clayton and T. E. Lawrence.

After three months there, working up Arab questions on the Hejaz side, she was deputed as Liaison Officer at G.H.Q. of the Force in Mesopotamia. She came over to Basra and at first she was attached to G.H.Q. Intelligence, but after a few weeks working up tribal questions from our side of the desert she was transferred to my department, and so began those ten years of most devoted service to myself and my successors which were only ended by her untimely death in 1926. The great experience she had of Arab traditions, and Bedouin customs, and the knowledge of individuals which she had gained in this and previous journeys was an enormous asset to us all. For me she became, when she joined me, what I called Oriental Secretary. A very necessary part of my work at that time was that of interviewing innumerable sheikhs and tribal leaders whom we came in touch with as the Force advanced: it was impossible that I could deal with every one, and Miss Bell used to act as filter, with all these sheikhs, and send them to me with a note as to where they came from and who they were. Her work was of the very greatest value to me.

The great Bedouin tribes migrate right across the desert from Syria to the 'Iraq border, and some of the great figures that we have seen crossing the stage in Syria we meet again in 'Iraq. Fahd ibn Hadhdhal, for instance, whose photograph we have seen on the screen, was an old friend of mine in 'Iraq; and tribal questions as between Syria and 'Iraq are entirely dependent upon one another, so that the knowledge we gained as a result of Miss Bell's previous work and travels was exceedingly valuable. There are many personal aspects of her work which I should like to touch upon, but which it is impossible to go into now, because it would take too long; but I should like to say what a great privilege I feel it to have been associated with her and to have worked with her all those years, and how glad I am to-night to have had the opportunity in this company of paying some tribute to the great lady whose loss we so greatly deplore.

Brig.-Gen. Sir GILBERT CLAYTON: Although Arabia has intruded itself upon nearly all the work, and indeed a good deal of the so-called play, which

have fallen to my lot during the last ten or fifteen years, I do not pose as an Arabian expert, and indeed he would be a bold man who would attempt to traverse or criticize any of the statements made by so eminent an authority as our President, and based on the notes of so great an explorer and traveller as Miss Gertrude Bell. But I should like to take the opportunity of paying a humble tribute to the value of Miss Bell's services in one particular phase of her many activities during the war, which happened to be closely connected with work for which I was responsible, and which brought her into close personal contact with myself. When the war broke out that much-maligned but none the less necessary institution, the Intelligence Department, realized that the Arabs were going to have a considerable influence on the result, at any rate so far as the Eastern theatre was concerned, and we endeavoured to establish an organization by which information should be collected, to enable us to take advantage of such pro-ally sentiments as might be induced by various means, pecuniary and otherwise, in that part of the world; and the result of our efforts was the establishment of an Arab Bureau, which I may say owed much of its impetus—indeed, almost all of its impetus—to our President, who has given us the lecture this evening.

You have all heard of Colonel Lawrence's wonderful exploits; and indeed they were wonderful, and are wonderful. But it is not always realized what a large amount of preparation had to be made before those exploits became possible, difficult though they were in any case. That preparation entailed a lot of very hard, perhaps to some extent uninteresting work during the earlier days of the war, and the collection of a very large amount of information. The Arab Bureau was engaged in that work, and you can, I think, after what you have heard this evening, realize our delight at hearing that Miss Gertrude Bell had consented to come out and give us her assistance—and very valuable that assistance was. Indeed, I attribute much of the success of Colonel Lawrence's enterprises to information and study in which Miss Bell had a very large hand, and I think no one would be more ready to acknowledge that than Colonel Lawrence himself, were he here to-night.

I will not make any remarks on the general statements that the President has made, except to put one thought into your minds in connection with the value of exploratory work such as Miss Bell undertook. I will give you these simple facts. The President mentioned Ziza as the starting-point of Miss Bell's expedition. That was just before the outbreak of the war. Ziza is now the starting-point of the air route between Palestine and Mesopotamia. Miss Bell undertook a camel-ride back from Baghdad to Damascus. A very fine performance for any woman, indeed any man. That journey can now be done, only ten to thirteen years afterwards, by motor-car. I think if you just ponder a little on those two facts, you will have some idea of the value of expeditions such as Miss Bell undertook.

Just one word in conclusion. I have had the privilege, and have the privilege, of the acquaintance of most of the leading Arab rulers and many of the chiefs in Arabia. I have never met one who has not either known Miss Bell personally or by repute, and I have never met one by whom she is not held in affection, in honour, and in reverence.

Sir HUGH BELL: Some years ago I had the honour to receive at the hands of your Society the Founder's Medal on behalf of my daughter, and now I have once again to thank the Royal Geographical Society for the honour that they have done her and her memory by the most excellent lecture you have heard from your President. We were of course aware, to some extent at all

events, of the dangers which our daughter ran when she left Damascus on that journey into Southern Arabia. I remember after she had been some weeks, months perhaps, on the way I began to consider what I should have to do in the event of things turning out as unfortunately as at one time seems to have been possible. I went to Lord Cromer and consulted with him as to what course I should take should cause arise, and we agreed as to what should be done; but Lord Cromer added, "You need not be concerned. She will come through all right." And so she did.

I have here to ask you to accord to your President your thanks for the most excellent and interesting lecture which he has delivered. To us, her relatives, her loss is quite beyond words; to me, her father, irreparable. I think there never were father and daughter who stood in such intimate relations as she and I did to one another. And so, Sir, it gives me the greatest pleasure to hear you accord to her all that honour which you have been good enough to do this evening, and it gives me greatest satisfaction, therefore, to be permitted to move that the best thanks of this meeting be given to you for your lecture.

Admiral Sir WILLIAM GOODENOUGH: I have been asked to second and to support Sir Hugh Bell in his vote of thanks to the President for his lecture. It is not my intention to speak to-night of the travels of Gertrude Bell except, if you will allow me, Sir, to thank you for the way in which you have treated both her notes and her memory; but I would, for a moment, speak of her as a personality, for although many notices have appeared of her in the newspapers, and also in the *Geographical Journal*, so far as I know no public estimation of her has been made at one of our fortnightly meetings here. What was it that caused such universal admiration and affection for her? Not only her powers, great as they were. She was one of the first women to get a first class at Oxford; a really great traveller, and not only one who travelled widely but one who observed with great intelligence, assimilated with discretion, and described with great skill all that she had seen and heard; one of our best known archæologists; an administrator who at once obtained the confidence of all those with whom she dealt, European or native; one of the boldest riders to hounds that you can think of; imbued with a courage beyond that ordinarily given to man or woman, and the most fascinating companion. There was another quality in her which was most endearing—her sympathy with and affection for all children. I can remember a day, long before the war, when she and Valentine Chirol sat on a bench in a garden in Wales and told stories, some serious, some amusing, some almost frivolous, while a group of children sat spellbound listening to the strange but absolutely true things that they heard.

But that was the product. What was the root and stem from and by which it sprang? It was her absolute sincerity. Politically—and I speak in the broadest sense of the word, not of those petty matters of Press and Party, of which she took no count—broadly she was a Constitutionalist. She believed in and stood on the foundations on which the growth of this country has been laid—honour, justice, truth, freedom. Those were the qualities which actuated her life and which she inspired in others. Her mind soared high. Like other great spirits, she was prepared to build new things on those firm foundations. An enthusiast yet not a fanatic, an idealist yet not a visionary, she was not content to sit on the dry stones of convention hugging a sluggish security. Her belief in the progress of the world was unconquerable. I remember her saying, "We must go on; if we stand still we go back."

Whether at the last moment she was conscious that her spirit was passing

from us we do not know, but if she was so conscious I believe that her thoughts and hopes could be described in those words written by Masefield :

> "Oh, given spirit now taken,
> Keep to this faith unshaken,
> That the good thing well willed
> Becomes fulfilled."

Her life was an inspiration, her death a grievous loss ; but if ever man or woman left this world victorious it was Gertrude Bell.

The PRESIDENT : I am more than obliged to Sir Hugh Bell for proposing, and to Sir William Goodenough for seconding, a vote of thanks ; but a vote of thanks was really the last thing that I deserve for attempting to pay a tribute to one whom I knew for nearly forty years and in whose company I have taken greater pleasure than in that of almost any one else that I have known in my life. I was glad to hear Sir Gilbert Clayton's assurance that Miss Bell is still so well known throughout the length and breadth of the Arab world. I can endorse that. I do not think that any European has enjoyed quite the same reputation. She had all the charm of a woman combined with very many of the qualities that we associate with men. She was known in the East for those manly qualities. Fattuh, her servant of whom I spoke, was also my servant for one journey. He had gone with Miss Bell five years before he went with me. I remember an awful week in the north of Syria when it rained day after day, and day after day I told him we could not start because the weather had not lifted. Once he did not ask, but merely said, "I suppose we don't start to-day?" I said, "No." He said, "No, *we* shan't start, but the *sitt*" (*i.e.* Miss Gertrude Bell)—with an expressive gesture—"*she* went through water and mud to her waist." In those days Miss Bell could outtire any man and had the courage of any two men. I shall not serve any good purpose by trying to say how much I, and many others, have felt her loss. Hers was the brightest spirit that shone upon our labours in the East during the War.

PROBLEMS OF THE LIBYAN DESERT

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Map following p. 96.

THERE can be few tracts of the Earth's surface which present such a number and variety of interesting geographical problems as the Libyan Desert. The following are some of the more puzzling of the questions which have been asked at various times since I made my first acquaintance with the desert thirty years ago :

1. Did the Nile, or a branch of it, ever flow through the Libyan Desert to the west of the present Nile Valley ?

2. By what natural agency were the great depressions in the Libyan Desert excavated ?

3. Can other depressions in this region, besides the much-discussed Wadi Rayan, be considered possible of utilization in

connection with irrigation, flood-protection, or drainage of the Nile Delta, or as sources of water-power for Egypt?

4. Whence comes the artesian water of the oases?

5. Why have not certain lakes, such as Sittra and Bahrein, situated as they are in an almost rainless region, long since dried up?

6. Can the present scanty supplies of drinkable water derived from local rainfall along the Egyptian Mediterranean Littoral be supplemented by artesian borings?

7. Are the artesian water-supplies of the oases gradually diminishing?

8. Where shall we look for the mysterious "Zerzura," or "Oasis of the Blacks"? Are there any other "lost" oases remaining to be discovered?

9. Can the present difficulties of travel in the Libyan Desert, which are chiefly due to scarcity of water, be alleviated by the sinking of new wells?

10. Where are the "Tortoise Marshes" of Ptolemy?

11. What determined the peculiar distribution of the sand-dunes, some of which extend in straight lines for hundreds of kilometres?

12. What is the full extent of the distribution of flint implements and pottery, of which accumulations have been found in what are now among the most desolate parts of the desert, and what light does this throw on human history and climatic changes?

To most of these questions no completely satisfactory answers have as yet been given, though several of them have been the subject of painstaking investigations by many workers. Our knowledge of the facts bearing on them has, however, increased considerably during the past few years; and in the present paper I propose briefly to review the various questions in the light of the latest available data concerning them.

The problems, though they concern a variety of subjects, are very much interwoven with each other, and they are mostly alike in that the first difficulty in any attempt to solve them has always been the incompleteness of our geographical knowledge concerning the Libyan Desert as a whole. If we possessed a series of detailed contour-maps covering the whole of the desert, most of the problems would be in a fair way of solution. But the surveys which would be necessary for such a result are impracticable at present, mainly on the score of expense.

Some fifteen years ago I essayed the construction of a contoured map of the Libyan Desert, in connection with the International "Million" map of the world. But I had to give up the task, finding that there were vast areas without a single observation for altitude, while such altitude-data as did exist were open to errors of a magnitude intolerable for even a preliminary contouring of the areas with which they were concerned. The attempt however was not without its value, because it

drew attention to the great lack of reliable levels in the Libyan Desert, and to the necessity of remedying this defect before even an approximately true picture of the general relief could be obtained.

In the interval which has elapsed since my former attempt, a great deal of surveying has been carried out in the Libyan Desert, and in most of this work special attention has been paid to the matter of levels. Two long chains of triangulation have been run westward from the Nile to Siwa Oasis, one *viâ* the Wadi Natrun and the other *viâ* Baharia Oasis; another chain has been completed along the coast westward from Alexandria to Sollum, and a triangulation is now being carried out which will eventually connect the oases of Kharga and Dakhla with the Nile Valley. Small local triangulations have also been made in certain areas, such as Dakhla Oasis and in the neighbourhood of Owenat. In all these triangulations vertical as well as horizontal angles have been observed, so that reliable trigonometric altitudes are now available for almost all the points occupied or sighted. In the southern and central parts of the desert, we are still dependent on barometric levels; but the old determinations have mostly been replaced by later and better ones; and the use of motor-car transport, by facilitating exploratory journeys in hitherto untrodden regions, has permitted of a large number of additional determinations being made in tracts where no previous observations of any kind existed.*

Owing to the methods employed in the latest barometric determinations, the resulting altitudes are of a much higher order of accuracy than could be hoped for in previous measurements of the kind; in fact, it is believed that they are not so very far behind trigonometric levels in precision. This increased accuracy has been rendered possible by the collaboration of the Egyptian Meteorological Service, which, thanks to the abundant weather-data now received and dealt with by it, is in a position to furnish a close approximation to the sea-level pressure at any point in the deserts at any given instant. The aneroids used in the desert explorations are compared with the standard barometer of the Meteorological Service immediately before the start and immediately after the return of each expedition. At each observation in the desert,

* The use of motor cars for reconnaissances in the Libyan Desert, initiated by the British Army during the Great War, has been considerably developed in the last few years by Prince Kemal el Din Hussein (son of the late Sultan of Egypt), who has made several long exploratory journeys with a fleet of cars of the caterpillar type, specially constructed so as to be capable of carrying considerable loads over sandy tracts which were impassable to the Army patrols. The expeditions organized and led by His Royal Highness have resulted in important additions to geographical knowledge concerning the Libyan Desert, especially the southern and western regions, which have hitherto been practically inaccessible. I had the pleasure of accompanying the Prince on three of his journeys, and am much indebted to him for thus affording me the opportunity of making many observations which would otherwise have been impossible to me. I have further to thank him for kind permission to illustrate this paper by reproductions from a selection of the excellent photographs taken by him during our travels.

the date and time, and the temperature of the air, are noted, as well as the approximate latitude and longitude of the place. On the return of the expedition, the recorded reading is corrected for the error of the aneroid on the standard barometer, and the Meteorological Service is asked to supply the sea-level pressure at the particular place and time of the observation. From the difference of the two pressures and the air temperature, the height of the place above sea-level is then worked out directly with the aid of Jordan's table of "Barometrische Höhenstufen." If the place of observation lies considerably above sea-level, a small correction is applied to the observed air-temperature to allow for the temperature-gradient in the air; for of course it is the mean temperature of the air column between the place and sea-level which should be employed in the reduction.

It is unlikely that with this procedure either the sea-level pressures or those observed at the places can be in error by much more than half a millimetre; and consequently, even with some slight uncertainties in the air-temperatures, the resulting altitudes may be expected to be accurate to within about 15 metres when only a single observation has been made, and to within much less than this when, as is usually the case at important points, the altitudes have been calculated from a series of readings spread over several days. That this degree of accuracy is actually attained seems evident on comparison of the levels obtained for the same places on different dates. Thus, for instance, at a camp close to Bir Terfawi, during a stay of five days in January and two days in March 1925, I made in all eighteen aneroid observations. The mean altitude found was 244 metres; the average deviation of a single observation from this mean was 8 metres, the maximum being 16. On the assumption that all sources of error are accidental, the probable error of the mean resulting altitude works out at less than 2 metres, which is about the same as might be expected in trigonometric levelling to the place from the Nile Valley.

The points in the interior of the Libyan Desert of which the levels are fairly accurately known now number many hundreds, and with the exception of a large blank in the unexplored west, and another between the Nile and Merga in the Northern Sudan, they are fairly well distributed over the country. It therefore seemed to me to be worth while to make another attempt at a contoured map; for the levels now known (though still far too few for contours to be drawn with any great precision) might suffice for the construction of a map on a comparatively small scale and with contours at fairly wide intervals; it was felt that a provisional map of this kind, besides affording at least an approximate general view of the relief, might help towards the solution of one or more of the problems which I have mentioned above. I commenced by sketching in the contours at 100-metre intervals on the original sheets of the 1 : 500,000 map of Egypt, a revised edition of which is in preparation. They were

then reduced to the million scale, and afterwards still further reduced, with additions from my own recent observations around Owenat, Gebel Kissu, and Merga, from Hassanein Bey's records of his journey between Jalo and El Fasher, from the altitude-data obtained by the Anglo-French Boundary Commission in the Sudan,* and from the maps of Prince Kemal el Din's expedition of 1926 to Owenat and Sarra Well,† to form the map following p. 96. The attempt has, I think, fully justified itself, and more than fulfilled the hopes that were entertained concerning it.

Probably the feature that will first strike the attention on glancing at the contoured map is the series of depressions below sea-level stretching westward from near Cairo to Jarabub. The following table gives a list of the principal of these depressions, with the approximate extent of the areas lying below sea-level, and also (where known) the depths below sea-level of their deepest parts. Where the lowest part is covered by a lake, the depth shown is that of the water-surface, not that of the lake-bottom :

Depression.	*Approximate area below sea-level in sq. kiloms.*	*Approximate depth of deepest part below sea in metres.*
Wadi Natrun	220	23
Faiyum	700	45
Wadi Rayan	280	43
Qattara (including Moghara, Qara, and Tebaghbagh)	18,000	134
Sittra (including Timata)	300	33
Bahrein (including Nuemisa)	150	15 (?)
Watiya	70	15
Areg	60	25
Siwa (including Maasir and Maraqi)	800	17
Girba	20	(?)
Kheiba	40	(?)
Shiyata	20	(?)
Melfa (including Shebat, Exabia, and Gagub)	260	18 (?)

As will be seen from the figures in the table, by far the largest and deepest depression in this series—seven times as large, in fact, as all the others put together—is that of Qattara, which has not been shown on any previous map, and of which the existence was proved only last year. That so deep a depression should exist comparatively near to the Mediterranean and to Cairo, and have remained undiscovered until now, is striking evidence of how much has still to be learned concerning the configuration of the desert surface. The manner in which the discovery was made is perhaps worth placing on record. Hearing early in 1917 that a military patrol was about to operate in the Qattara region, I lent a small aneroid to the officer in charge of the patrol, and asked him to take readings with it at various points along his route, with the object

* Kindly communicated by Mr. A. R. Boyce, Director of Sudan Surveys.

† Printed by the French Army Staff, 1926.

of getting some idea of the altitudes in that region. It was, of course, certain that low-lying country existed along the foot of the Qattara escarpment, but no idea was entertained that any great part of it might be below the level of the sea. The officer brought back aneroid-readings which seemed to indicate that the spring at the foot of the scarp at Qattara was about 60 metres below sea-level; but the aneroid itself was unfortunately lost during the return journey. The result was too surprising for it to be accepted without evidence that the readings of the instrument had not been vitiated by accidental rough treatment, and consequently I refrained at the time from placing the levels found on the maps. But I resolved to confirm them or otherwise on the first opportunity.

That opportunity came last year, when it was possible to send a survey-party to triangulate westwards from the Wadi Natrun so as to cross the place where the aneroid readings had been taken. The work was entrusted to Mr. G. F. Walpole, of the Survey of Egypt, who had already distinguished himself by successfully carrying out a difficult triangulation from the Nile across some 500 kilometres of the Libyan Desert *viâ* Baharia to Siwa. The result of Mr. Walpole's work was not only to confirm the substantial accuracy of the previous estimation of the level of the Qattara spring, but to bring to light the existence of a vast hollow, thousands of square kilometres of whose floor lie at even lower levels, and which at one place descends to a depth of no less than 134 metres below the level of the sea.* This last-mentioned spot, some 100 kilometres south-south-west of the Qattara spring, is probably the lowest-lying point on the land-surface of the African continent.

A scarcely less remarkable feature is the series of depressions comprising the oases of Kharga, Dakhla, Abu Mungar, and Farafra; while Baharia occupies a more isolated position about midway between Farafra and the Faiyum. In contrast with those of the northern series, these southern depressions do not penetrate to sea-level. The lowest points in Kharga Oasis are probably at or just below the level of the sea, but the general level of the Kharga floor is about 70 metres above that datum. The lowest point of Farafra is somewhat higher than the general level of Kharga; those of Dakhla and Abu Mungar are higher still, while in Baharia, though it lies farther to the north, the floor-level averages some 130 metres above sea.

A noteworthy thing about the larger depressions is that their northern boundaries are formed by steep escarpments, while to the south the slope is more gradual. This is the case, for instance, with the Faiyum, Qattara, Siwa, Kharga, Dakhla, Abu Mungar, and Farafra. Baharia is unique

* By way of comparison, it may be remarked that the area (at the sea-level contour) of the Qattara depression is about four times that of the Dead Sea and Jordan Valley depression; but the latter (reckoning to the lowest point of the bed of the Dead Sea) is about six times the deeper of the two.

in being entirely surrounded by escarpments, as also in containing a large number of hills approximating in height to that of the bounding scarps. In the majority of cases the greater steepness of the northern boundaries can be correlated with geological structure; the northern walls of the Qattara and Siwa depressions, for instance, mark the southern limit of certain Miocene strata, while those of Kharga and Dakhla coincide with the southern limit of the Eocene limestones.

To the south-west of Dakhla Oasis there stretches a broad tract of rising ground, with the Gilf Kebir and the peaks of Arkenu, Owenat, and Kissu as conspicuous features. On either side of this tract the general level falls, on the one hand towards Kufra and Cyrenaica, and on the other hand towards the Nile. The Gilf Kebir is a great broken plateau of sandstone, rising very nearly to the 1000-metre contour and stretching in a direction a little west of south for over 100 kilometres. I saw the south end of this plateau from several points on the way from Terfawi to Owenat when travelling with Prince Kemal el Din in 1925, and fixed its position by compass-bearings. As seen from the south, the plateau appeared to be merely a flat-topped hill; its true form and extent were discovered by the Prince in the following year, when he passed along its eastern foot on his way from Pottery Hill to Owenat. The highest peak of Arkenu, in about lat. 22° 17′, long. 24° 46′, I estimated to rise to approximately 1410 metres above sea. The altitude of Gebel Owenat far transcends Hassanein Bey's previous estimate of 1100 metres; a trigonometric measurement which I made in 1925 gave its summit as 1907 metres above sea. The general level of the ground at the foot of Owenat I found to average about 600 metres, thus agreeing with Hassanein Bey's figures. Gebel Kissu, though lower than Gebel Owenat, is considerably higher than Gebel Arkenu, and being an isolated mountain with a single well-marked peak, it forms a very conspicuous landmark; my trigonometric determination gave 1726 metres for the altitude of the peak above sea.

To the south-west of Kissu there are a few widely scattered isolated hills, but the country in general forms a rolling plain of sand extending to the north-east corner of French Equatorial Africa with a nearly uniform level of about 700 metres. Beyond the French boundary the ground rises towards the Erdi Hills, which attain over 1000 metres.

From the corner of French Equatorial Africa to Merga, a distance of 250 kilometres, the country consists of alternations of sand-plains and flat stony tracts, with a very gradual fall to a level of about 560 metres at the edge of the Merga depression.

Between Merga and Owenat the country consists of sandy plains alternating with broken stony ground and occasional hills. The general level rises from about 570 metres on the northern side of the Merga depression to nearly 800 metres on the parallel of 20° 30′, then gradually falls to about 600 metres at the foot of Gebel Owenat.

1. *Did the Nile, or a Branch of it, ever flow through the Libyan Desert to the Mediterranean?*

The idea that a " dry river " exists in the Libyan Desert is a very old one, and seems to have had its origin in the fact that barren depressions in that region are sometimes called by the local Arabs *Bahr bela ma*, that is, " sea without water." But the Arabic word *bahr*, which properly means a sea or a lake, as in Bahr Lot (the Dead Sea), is also applied in Egypt and the Sudan to a river, as in Bahr el Nil (the Nile) and Bahr el Azrak (the Blue Nile).*

The earliest depression to be discovered bearing the name of *Bahr bela ma* was the one now known as the Wadi Faregh (the " empty wadi "), situated immediately south of the Wadi Natrun. Father Sicard, who visited the place in 1712, correctly interpreted the Arabic name to mean literally " sea without water," and having discovered fossil trees there, which he imagined to be the petrified remains of masts of ships, he inferred that a narrow arm of the sea formerly extended from the Mediterranean into the locality.† At a later date Sicard's view that the petrified trees were the masts of ships was recognized to be a mistaken one; but a greater error was committed by changing the translation of *Bahr bela ma* from " sea without water " into " river without water," as was done by D'Anville in his ' Mémoires sur l'Egypte,' published at Paris in 1766. D'Anville was a great authority in his day, and his translation was adopted by subsequent writers for over a hundred years. General Andreossi, who commanded Napoleon's artillery in the expedition of 1798 and 1799, made a map of the " Dry River " and the " Valley of the Natron Lakes," in which both depressions are shown open at both ends, instead of being closed in as they really are. Andreossi considered that the " Bahr bela ma " was the dry bed of an ancient branch of the Nile, which left the present Nile Valley somewhere in Middle Egypt and entered the sea to the west of Alexandria; he also thought that the ancient Lake Moeris was probably formed by the damming of the " dry river " near its supposed offtake from the Nile.‡ Later on, after Cailliaud and other

* A similar ambiguity of meaning very commonly attaches to Arabic geographical terms. Thus *beled* may mean either a village or an entire country; *gebel*, either a mountain or a desert; *gezira*, either an island or a part of the Nile bank which is alternately covered and uncovered by the rise and fall of the river; *bir*, which properly signifies a well, is often used to denote a spring or a water-cistern; *wadi*, though its proper meaning is a valley, is also sometimes employed for a closed-in depression, as in the case of the Wadi Natrun.

† ' Nouveaux Mémoires des Missions de la Compagnie de Jesus dans le Levant,' Tome ii. (Paris, 1717), p. 74. This little book contains a map of Egypt, prepared by Father Sicard at Cairo in 1715, on which the " Mer sans eau " is shown with " bateaux petrifiez " depicted alongside it.

‡ See " Particulars concerning the Valley of the Natron Lakes, and that of the Old Bed of the River " (with map) by Andreossi, General of Artillery, in ' Memoirs Relative to Egypt, Written in That Country during the Campaigns of General Bonaparte in the Years 1798 and 1799, by the Learned and Scientific Men who Accompanied the French Expedition ' (London, 1800), p. 270.

early nineteenth-century travellers had discovered that other depressions existed in widely separated localities and bore the same Arabic name of *Bahr bela ma*, it seems to have been hastily assumed by the cartographers of the time that all the depressions bearing the same name were parts of a single dried-up river-channel. Thus, on a large map of Egypt compiled by Colonel Lapin and published at Paris in 1856, the " Bahar Belah-mah ou Fleuve sans eau " is stated to come from the Congo and is depicted as coursing through the Oasis of Dakhla, thence passing to the east of Baharia Oasis and on to the Mediterranean. On another large map of Egypt, compiled by Muzzi Bey, the then Director-General of Egyptian Posts, and published in Florence in 1876, a continuous valley is boldly shown leading from the mountains of Darfur to the Mediterranean, while cross-valleys, labelled " Old Bed of the Nile," are depicted as connecting the main valley with that of the Nile at Korosko and Dongola.

The Rohlfs expedition of 1874 proved that there was no such channel running northwards through Dakhla Oasis ; that the " Bahr bela ma " which had been crossed by Cailliaud between Siwa and Baharia was merely a closed-in local depression, and that the continuous empty river-beds which were shown on the maps of that period had no real existence.*

But though the continuous " Bahr bela ma " channel of the old cartographers has been shown to be purely imaginary, and has in consequence disappeared from our modern maps, the belief that an old dry river-bed *may* exist *somewhere* in the Libyan Desert has apparently persisted in many minds even to our own day. Only a few years ago I was called upon by the Government to discuss a suggestion, made in all seriousness by a person of considerable eminence, that the Nile, or a branch of it, must at one time have followed a course from somewhere near Dongola through some of the Egyptian oases to the Mediterranean ; and that by tracing out the old channel, and deepening it artificially where necessary, a part of the river might be taken off along this path and its water utilized to irrigate the desert country on either side of it. To the few scientific travellers who have journeyed extensively in the Libyan Desert, it will doubtless appear incredible that such a suggestion as this could be seriously made. But old traditions concerning the geography of little-known regions die hard, and this particular one has probably been fostered by the circumstance that on most small-scale maps the oasis-depressions have been shown without any precise indication of the altitude of the intervening ground, as well as by the speculations of geologists as to the existence of a river in the region in past geological ages. Blanckenhorn, for instance, published in 1902 a series of small-scale maps depicting the course of a hypothetical river, the " Libyan

* See Rohlfs' ' Drei Monate in der libyschen Wüste ' (Cassel, 1875), p. 337 ; and Jordan's ' Physische Geographie und Meteorologie der libyschen Wüste ' (Cassel, 1876), p. 214.

Ur-Nile," running northwards through the desert in the Eocene and Oligocene periods, and ceasing to exist in the Pliocene.*

That a river flowed during late Eocene or early Oligocene times in a north-easterly direction through what is now the Libyan Desert, and entered a sea near what is now the Faiyum, can scarcely be questioned; for it is only by the existence of such a river that we can account for the assemblage of fossil trees and curious remains of Eocene animals (including the ancestors of the elephant) discovered by Mr. Beadnell north of the Birket el Qarun and described by the late Dr. Andrews.† As to the size, length, and exact position of this river of the geological past there is very great doubt; but neither its situation nor even its existence can be considered material to our present inquiry. No one conversant with the known facts bearing on the general geological history of Egypt during late Tertiary and Quaternary times could make the mistake of thinking that the path of an Eocene river might be traceable in the present desert relief. The evidences of such path must be purely of a geological nature. In his endeavours to suggest what might possibly have been the course of the river on whose banks the Eocene animals lived, Mr. Beadnell found in two localities deposits which might have been formed along the ancient drainage-line; and in both these localities the deposits now occupy the summits of hills. There is insufficient evidence of any kind to justify so exact a location of the Eocene river as Blanckenhorn's maps would suggest, and none whatever of any relationship, either between the present surface-configuration of the desert and Eocene or Oligocene drainage-lines, or between those drainage-lines and the River Nile. The appellation "Ur-Nile" of Blanckenhorn is thus a misleading one. If we are to look for traces of a dried-up river in the surface-forms of the Libyan Desert of to-day, it must be a river which, like the streams which eroded the great wadis of the Eastern Desert, existed in geologically recent times, and which became dry either through the continual deepening of the present Nile-channel, with consequent capturing of the former drainage, or through climatic changes causing a diminution of rainfall in the collecting area.

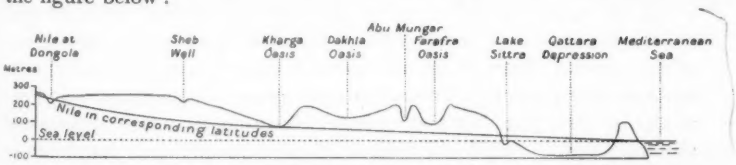
A study of the contoured map seems to me to be absolutely conclusive on the question at issue, for it indicates clearly that at no time within the geologically recent period can there have been any such continuous channel as has been supposed. Let us try and trace, with the aid of the map, the most likely course along which the ancient Libyan Nile-branch, if ever one existed, must have flowed. Starting from the Nile in the neighbourhood of Dongola, we observe that the lowest possible track is through Sheb towards Kharga. But Sheb can only be reached after passing over some 350 kilometres of desert lying well above the level of the Nile at Dongola, which is about 230 metres above sea. It is, of course, quite

* 'Zeitschrift der Gesellschaft für Erdkunde zu Berlin,' 1902, Tafel III.

† 'Topography and Geology of the Fayum Province of Egypt' (Cairo, 1905), p. 67.

conceivable that even within geologically recent times the Nile at Dongola may have been considerably above its present level; so that we may pass over this first difficulty as not being definitely conclusive against the hypothesis we are pursuing. From Sheb to the south end of the Kharga depression there is a drop of about 160 metres, so that up to this point a channel may have been possible. But from here onwards, difficulties come in. If we turn northwards, we soon encounter the north wall of Kharga, rising to 300 metres above sea-level; so there is no continuing that way. Instead, we turn westwards towards Dakhla. But from Kharga we have to pass over ground reaching very nearly to the 200-metre contour for some 80 kilometres to enter the Dakhla depression, where we drop to a level of 119 metres. We have to traverse some 15 kilometres at altitudes above 200 metres to reach Abu Mungar, where the level is 117 metres; then a further 12 kilometres lying above the 200-metre contour to get to Farafra, where the level descends to about 90 metres. To get out of Farafra, we have again to traverse country lying over 200 metres above sea, whether we choose a north-westerly route *viâ* Sittra to the Qattara depression, or a north-~~westerly~~ easterly one *viâ* Baharia to the Wadi Rayan and the Faiyum. Taking the first of these alternatives as being the shorter, we cross some 30 kilometres of ground above the 200-metre level, and a further 120 kilometres lying between the 200- and 100-metre contours, before reaching the Qattara depression. And once we are in the Qattara depression (the lowest point of which is 134 metres below sea), there is no possibility of reaching the Mediterranean except by crossing a considerable tract where the ground-level is over 100 metres above sea-level.

A section of the route described, with a comparison-line passing through the present Nile-levels in corresponding latitudes, is shown in the figure below:



Profile from the Nile at Dongola through the depressions of Kharga, Dakhla, Abu Mungar, Farafra, and Qattara to the Mediterranean. Vertical scale 500 times the horizontal. Total length of section about 1700 kilometres; for more than half this distance the ground-level is seen to be above a line drawn through the levels of the Nile in corresponding latitudes.

Can any one believe that a course of this kind was ever that of a river? To make a through channel would entail deep cutting for more than half the total distance of 1700 kilometres, and would consequently involve excavating hundreds of millions of cubic metres of rock, much of it of considerable hardness. Moreover, it cannot be supposed, in the

present state of our knowledge of the region, that more favourable lines of communication exist and have been overlooked. Many depressions doubtless still remain to be discovered; but these, like those already known, will surely prove to be merely local basins. So many cross-country journeys have now been made in various directions through the desert, that it is inconceivable that any continuous channel of the kind we are discussing could possibly have escaped notice. Nor can we reasonably suppose that recent earth-movements have produced the present severance of the various depressions; such movements might perhaps be invoked to account for one or two of the separating elevations, but certainly not for all. We can therefore be absolutely certain that neither the Nile nor any branch of it ever passed through the Libyan Desert to the sea.*

Even channels of tributary streams to the Nile, such as abundantly survive in the great wadis which enter the Nile valley on its eastern side, are markedly absent in the Libyan Desert. The contours on the map suggest that possibly one such tributary stream may formerly have drained the south-western faces of the great plateau in which the depressions of Dakhla and Kharga form bays, and have entered the Nile somewhere between Aswan and Halfa; but if such a channel ever did exist, its actual traces have long since been obliterated by the smoothing action of subsequent denudation, and only the great escarpment of the plateau which it half encircled remains to tell the tale.

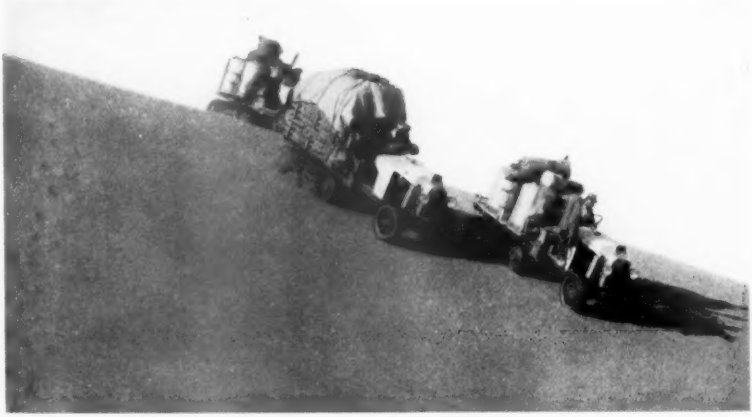
2. *Origin of the Depressions.*

It is a marked characteristic of almost all true deserts, that they are regions of internal drainage; and the Libyan Desert is no exception to the rule. There are a few gullies draining from the plateau to the sea along its northern edge, and a few others draining into the Nile Valley along its eastern border. But none of these external drainage-lines extends for more than an insignificant distance backward into the interior of the country. There is, in fact, in the Libyan Desert (especially in its north-eastern portion) a marked absence of any distinct drainage-lines at all; in their place we find extensive stony plains, which either slope gradually down towards the various inland depressions, or terminate in an abrupt fall where the depressions are cut back into them. Even in the

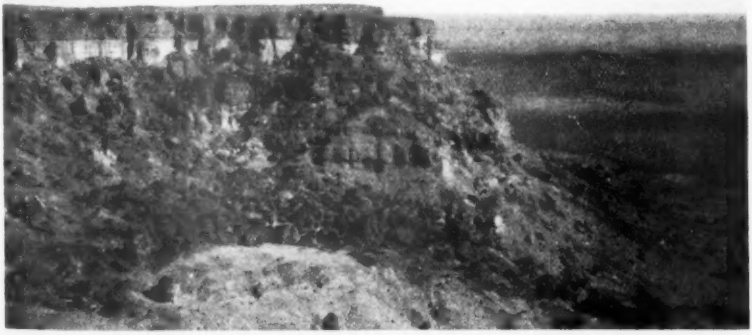
* Since the above was written, the Professor of Geography at the new University of Cairo, M. Lorin, has suggested that at a former geological epoch the Nile flowed through Siwa Oasis and thence westward so as to make Cyrenaica an island. (See 'L'Egypte,' published by the Institut Français d'Archéologie Orientale, Cairo, in December 1926, p. 153.) M. Lorin does not give any grounds for this suggestion, and I know of no evidence that would justify its acceptance. As will be gathered from my remarks elsewhere in this paper, it seems to me far more likely that Siwa and the other northern depressions were in recent geological times regions of central drainage, than that they were local deepenings of a single channel; and in regard to earlier geological periods we possess too little information to form any conclusions as to drainage-lines.

Photographs by Prince Kemal el Din, Dr. Ball, and Mr. Walpole

1. *Desert exploration with the ordinary car, requiring help even on flat ground in sandy tracts*



2. *Caterpillar cars carrying heavy loads over a sand-dune between Bir Terfawi and Gebel Owenat*



3. *The western wall of the Qattara depression* 35 *km. S.S.W. of Qara Oasis. Top of cliff about* 3 *m. and floor of depression* 133 *m. below sea-level*

4. *Ain el Hez, Baharia Oasis, irrigated by free flow from well*

5. *Overlooking the Baharia depression from the pass at its southern end: cars bound for Farafra*

6. *Northern end of Farafra depression: sandy ravine cutting back into chalk plateau*

Pluvial epoch, when Europe was glaciated and the deep wadis of the Eastern Desert on either side of the Nile were being cut out by great streams, there cannot have been any external drainage from a large part of the Libyan Desert; for if there had been, we should find the Libyan plateau far more intensely dissected than is actually the case. The rainfall in this region, even during the Pluvial period, must have been far smaller than in the neighbouring tracts of the Eastern Desert and Sinai; such rainfall as did occur was drained into the series of depressions already described, and there either formed lakes or was evaporated. But the action of inflowing drainage waters, carrying sand and mud in suspension and salts in solution, is not to *deepen* the basins into which they flow, but rather to *fill them up*. Hence we must look to some other cause for the formation of the basins themselves. A possible cause is to be found in earth-movements—either a local down-folding of the crust, or an upraising by faulting of the surrounding tracts. It is not unlikely that such earth-movements have to some extent conditioned the formation of the depressions; but that the depressions are not simply faulted-down areas or subsidences is abundantly clear from an examination of the bounding scarps and the floors of the larger oases. Baharia is wholly, and Kharga and Dakhla are partially, bounded by high escarpments, in many places hundreds of metres high, and the floors of these oases are composed of the same rocks as are exposed at the base of the bounding escarpments. It is, in fact, obvious that these great hollows are natural *excavations*, not subsidences. What was the excavating agency?

To the south-west of the limestone plateau which lies west of the Nile and extends northwards from lat. 23° 30′ there is fairly open sandstone country, and the oases of Dakhla and Kharga occupy great bays in the escarpment which marks the south-west termination of the plateau. It seems reasonable to suppose that the Eocene and Cretaceous seas had their southern shores somewhere about the latitude of Wadi Halfa, for the limestones do not extend far beyond the tropic; and to the south the hard limestones of the plateau probably passed gradually into softer shallow-water deposits, which would lend themselves easily to degradation and to removal by the agency of streams whose traces have long since disappeared. We can thus possibly invoke water-action to account for the primitive formation of the " bays " in which Kharga and Dakhla are situated. But we cannot in this way explain either the further deepening of these oases, which converted them into basins, or the excavation of the more northerly depressions such as Baharia and Qattara.

The problem as to how the excavation of the northern depressions, and the deepening of the southern ones, were accomplished is not altogether an easy one. There is, of course, no doubt that wind has been the main excavating agency. All the depressions occur in areas where soft rocks are overlain by hard ones, and once the hard overlying rock was removed

at any place, the action of the wind on the softer beds would soon excavate a hollow. The difficulty is only as to how the hard overlying rock was first removed. To some who have studied the question, a sufficient explanation is to be found in the general degradation, combined with the tectonic disturbances—folds and faults—which are known to have affected some of the oasis-areas, as, for instance, that of Baharia. Given an anticlinal fold, a general lowering of the surface by wind-degradation would eventually result in the exposure of the soft underlying beds at the highest point of the fold, and subsequently continued wind-erosion would proceed most rapidly on these soft underlying rocks. Others, while admitting this explanation as partly accounting for the formation of the depressions, consider that other factors must have assisted to cause penetration of the hard overlying beds, especially in the areas where folding is not very marked.

Of such other factors, I can only suggest what appears to me to be a possible one. About twenty years ago I was mapping the Mediterranean coastal area in the neighbourhood of Mersa Matruh, some 160 miles to the west of Alexandria. In this area, which has about 6 inches of rainfall in an average year, there are numerous closed-in basins a few miles long and a few hundred yards in width, descending to a depth of 10 metres or more in the rather soft limestone which forms the principal rock of the locality. These basins, though called wadis on the maps, are more usually known as *'ebs* or " bosoms " by the local Arabs. I was at first much puzzled to account for them ; but eventually I arrived at what I believe to be the true explanation of their formation. The basins, of course, collect the surrounding rainfall in the winter, and the drainage carries with it into the hollows a certain amount of fine loam and sand from the disintegration of the surrounding surfaces. After the rains, the bottoms of the basins become covered with vegetation, while the surrounding rocky surfaces are left bare. In the hot dry summer, however, the vegetation perishes, and much of the loam is removed by the wind. We have only to assume (what seems indeed likely) that the rootlets of the vegetation disintegrate the limestone floors of the hollows to form fresh soil, and that more of this is removed each year by the wind than is brought into the hollows by the drainage, to find an adequate cause for a slow but progressive deepening of the basins. The primitive hollow may well be a very slight depression of the surface, such as might arise from greater local softness of the rock and consequent more rapid weathering. Once vegetation has commenced to grow in a slight hollow of this kind, the action would lead to a slow yet steadily progressive deepening year by year, and sand-erosion would tend towards an elongation of the depression in the direction of the prevailing wind. Can such a process as this, continued through vast ages during which the climate was somewhat less dry than at present, have been active in the formation of Baharia and similar depressions ?

3. The Possibility of Utilization of Depressions in the Libyan Desert for Irrigation, Drainage, or Hydraulic Power.

The depression known as the Wadi Rayan, discovered by Mr. Cope Whitehouse about 1883, situated some 40 kilometres west of the Nile Valley and about 100 kilometres south of the latitude of Cairo, has been so frequently described and considered in regard to its utilization as a reservoir or as a flood-protection for Lower Egypt, that I need say little about it beyond a reference to the principal published works dealing with it.* There is no other depression in the Libyan Desert which has received so much attention from the economic standpoint. That the Wadi Rayan has not already been utilized as a reservoir has depended on a variety of considerations, of which one of the principal has been the doubts always entertained as to whether there might not be an underground leakage from it, resulting not only in a loss of part of the stored water, but also in damage to the adjacent flourishing province of the Faiyum. These doubts will not be lessened by the converging lines of evidence which I shall bring forward in dealing with the artesian water-supplies, all leading to the conclusion that there is an underground water-connection between the various depressions of the Egyptian Libyan Desert. Of late years, however, it has been proposed to make use of the Wadi Rayan, not as a reservoir, but as a sump for disposing of the drainage water of Upper Egypt by evaporation; and to this, in consequence of the lower level at which the water would stand in the depression, there is far less objection from the point of view of possible leakage or damage to the Faiyum.

The Wadi Natrun, which, though considerably less deep, is not greatly less in extent than the Wadi Rayan, has received some consideration as a possible sump for disposing of some of the drainage water of the Behera Province of the Delta. So long ago as 1895 the Public Works Department studied the possibility of draining Lake Mariut into the Wadi Natrun, and thus doing away with the increasing cost of keeping down the level of the lake by pumping water from it into the sea.† The Wadi Natrun has an area, even at the low contour of 10 metres below sea-level, of nearly 100 square kilometres, and the average rate of evaporation from an open water-surface within it could not well be much less than 3 mm. per day; the wadi could therefore dispose annually of at least 100 million cubic metres of drainage water by evaporation alone, and probably of a considerable additional quantity by seepage. But the

* See Sir Hanbury Brown's 'The Fayum and Lake Moeris' (London, 1892), pp. 40–48 and 106–110; Sir W. Willcocks' 'Perennial Irrigation and Flood Protection for Egypt' (Cairo, 1894), also the same author's 'Egyptian Irrigation,' third edition (London, 1913); Sir W. E. Garstin's 'Report on the Basin of the Upper Nile' (Cairo, 1904), Appendix I. pp. 6–9; and Beadnell's 'Topography and Geology of the Fayum Province of Egypt' (Cairo, 1905), pp. 16–24.

† 'Report on the Administration of the Irrigation Department for 1895' (Cairo, 1896), pp. 25–28.

high cost of cutting a drainage channel from Lake Mariut to the wadi, and the heavy maintenance charges which would be incurred in keeping the drain open, were formidable objections to the scheme. From a reconnaissance carried out in 1896, Mr. Verschoyle found that the length of the proposed drain would have to be almost 80 kilometres, and for the greater part of the way it would have to be a cutting 20 metres in depth through desert and ridges of drifting sand; he remarked that if it were an easy matter to make the connection, it would be no easy matter to maintain it; and he concluded that the scheme was an impracticable one.* A more recent proposal has been to construct a partly tunnelled channel instead of an open drain; but this has likewise been found to be impracticable, as involving too heavy an outlay for the benefits which would result.†

When the great extent and depth of the Qattara depression were established by Mr. Walpole's explorations of last year, hopes were immediately entertained that the depression might be made to serve some useful economic purpose. Any idea of its being of use as a Nile reservoir was of course at once cut out, not only by reason of its position and distance from the Nile, but also by its immense size; for even if we could turn the whole Nile flood into it, some twenty years or more would be occupied in filling it to a sufficiently high level, ‡ and the loss by evaporation from so large an area would be enormous. As a receptacle for drainage water from the Delta it appeared equally impossible of consideration, because of the great length and depth of the channels which would have to be cut to reach it. A more reasonable prospect seemed to be that of admitting sea-water from the Mediterranean into it by means of a navigable canal from the Arabs Gulf; this would only have to be about 56 kilometres in length to reach the nearest point of the depression; and once the canal was made and the depression filled, ships might sail almost to Siwa. Other advantages which might accrue from the formation of this inland sea were an increased humidity of the climate along the Mediterranean Littoral of Egypt, leading to increased rain-crops in that region, the establishment of a valuable fishery, and a possible increase in the water-supply of the oases by the causing of a

* 'Report on the Administration of the Irrigation Department for 1896' (Cairo, 1897), p. 129.

† It may be remarked that even if a channel were to be cut from Lake Mariut to the Wadi Natrun it would still be necessary to continue pumping on a large scale from Lake Mariut to maintain the present-day drainage. According to returns communicated to me by the Irrigation Service, the quantity of water removed from Lake Mariut by pumping during the last nine years has averaged nearly 650 million cubic metres a year; and even on the most optimistic estimate of evaporation and seepage the Wadi Natrun could not be expected to dispose of half this quantity after the lapse of the few years which would be occupied in filling it to a permanent level.

‡ The average discharge of the Nile past Cairo in a year is 67 cubic kilometres. The capacity of the Qattara depression at the sea-level contour is roughly about 900 cubic kilometres.

7. *Qasr Farafra, seen from the north over plain of powdery chalk forming floor of depression*

8. *Escarpment and "Hattia" of Abu Mungar from the south*

9. *The "Hattia" of Abu Mungar from the east: well on earth-mound on right*

10. *The principal well at Qasr Farafra*

11. *A street in Qasr Farafra, with irrigation canal*

slight rise in the static water-level there. Another idea, which rapidly followed the first one, was to utilize the depression as a source of electrical power for driving pumps by which the drainage of the northern parts of the Nile Delta might be improved. At first sight this latter prospect looked a very attractive one. The salt-marsh which covers much of the floor of the depression appeared suggestive of a former sea-connection, and if we could trace out this old connection, the cutting of a canal along it might not, it was thought, be a very expensive matter. Moreover, it was apparent that evaporation from an inland sea or lake of so large an area would keep pace with quite a large influx from the Mediterranean, so that if the influx were restricted to such a quantity as would permit of the lake-surface being maintained at a level considerably below that of the Mediterranean, power could be generated continuously. Suppose, for instance, that we maintained a permanent water-level in the lake of 50 metres below the sea; the estimated area of the lake at this level being 9000 square kilometres and the mean evaporation assumed to be 4 millimetres a day, an influx of no less than 36 million cubic metres of water per day could be passed into the lake without altering its level, and this with a fall of 50 metres would suffice theoretically for the continuous generation of over 270,000 horse-power. Of course the lake would gradually get more and more saline, but the power might continue to be maintained for very many years before the lake became as rich in salt as the Dead Sea.

But alas! an investigaton of the northern borders of the depression showed that the hoped-for traces of a former connection with the Mediterranean Sea do not exist. The depression is entirely shut in from the north, either by great cliffs, or by ground lying so high that the cutting of a canal to the sea is utterly impracticable. Of the 56½ kilometres from the sea-level contour of the depression to the coast along a line running 12° east of north from Moghara Lake (which is the easiest line hitherto found for the cutting of a canal), only 16 kilometres are at less than 50 metres above sea; 31 kilometres lie at altitudes between 50 and 100 metres; and 9½ kilometres are above the 100-metre level. An open channel being thus put out of the question, it was next natural to inquire whether a tunnel, or a channel partly open and partly tunnelled, could be excavated to serve for the conveyance of sea-water into the depression. But even this, though perhaps not impracticable, would be a very costly undertaking. The conveyance of the requisite quantity of water, even at a relatively high velocity (which of course implies a considerable slope), would necessitate a tunnel or tunnels of very large dimensions. To convey 36 million cubic metres a day at a velocity of 5 kilometres per hour would require a sectional area of 300 square metres—*i.e.* if two tunnels were made, each would have to be 14 metres in diameter. The cost of boring and lining such tunnels would certainly be very great, and it is doubtful whether the value of the power generated could justify the capital ex-

penditure involved in the excavation and other works which would be necessary. Until more is known of the nature of the strata through which the aqueduct would have to pass, and as to the length of tunnelling and amount of open cutting which would be required, it is impossible to form even an approximate estimate of the expense which the undertaking would involve. All that can be said at present is that the utilization of the Qattara Depression offers a possible means of obtaining power on a large scale for the drainage of the low-lying lands of the Delta, with at the same time a prospect of improving in some measure the agricultural resources of the Mediterranean Littoral; much further investigation will have to be accomplished before any judgment can be formed as to whether such a project would be an economically sound one.

In formulating any scheme for improving the drainage of the Delta, it is of course important to consider, not only the manner in which the drainage water could be ultimately disposed of, but also the modifications which would have to be made in the existing drains and irrigation canals—modifications which would need to be carried out without serious interruption to existing agriculture. A scheme which otherwise appeared attractive might easily prove to be impracticable by reason of the heavy expenses and inconveniences of the subsidiary works which would be required to make it effective.

(*To be continued.*)

THE LABRADOR BOUNDARY

THE Report of the Judicial Committee of the Privy Council on the Special Reference to them for consideration and report, under the Statute 3 and 4 Will. IV., c. 41, s. 4, should be pondered by all students of political geography. Never, perhaps, have larger and more important conclusions been drawn from vague and apparently inconclusive premises. And in studying the decision we must bear in mind the careful limitation of the terms of reference. The Judicial Committee explain that "the duty of the Board is not to consider where the boundary in question might wisely and conveniently be drawn, but only to determine where, under the documents of title which have been brought to their notice, that boundary is actually to be found." It is to be found not in evidence of occupation by either side, for there has been none effective; nor in treaties, for both parties to the dispute are British, and the dispute is of recent origin, first raised seriously in 1903. After some twenty years of argument the Governments of Canada and Newfoundland agreed to refer to the Privy Council the following question: "What is the location and definition of the boundary as between Canada and Newfoundland under the Statutes, Orders in Council, and Proclamations?"

The curious form of the question should be noted. A boundary is usually delimited by the language of treaties, statutes, and proclamations; located on the ground and demarcated in accordance with that delimitation; and finally described in the report of the Boundary Commissioners with maps and details of the boundary monuments. The reference to the Privy Council asked for location and definition. The boundary has now by their report been defined, but it is far from being located, as we shall see; and demarcation will be a heavy task for the future, of much technical difficulty, but possibly of immense commercial importance.

With one exception the Statutes, Orders in Council, and Proclamations are all more than 100 years old. British sovereignty over all such parts of the peninsula of Labrador as had not already been granted to the Hudson's Bay Company was secured by the Treaty of Paris, signed 10 February 1763. For future reference it will be convenient to set out the documents of title in brief form thus:

I. *Order in Council* 30 *March* 1763. Commission to Captain Graves to be "Governor of the island of Newfoundland and of the coast of Labrador with the several islands as above described" in a letter from the Secretary of State informing the Lords of Trade that the King "had judged it proper that all the coasts of Labrador from the entrance of Hudson's Straits to the river of St. John's, which discharges itself into the sea nearly opposite the west end of the island of Anticosti, including that island with any other small islands on the said coast of Labrador, and also the islands of Madalaine in the Gulf of St. Lawrence, should be included in the government of Newfoundland."

II. Commission under the Great Seal on 25 *April* 1763, *in accordance with I.* Captain Graves appointed Governor over ". . . all the coasts of Labrador from the entrance of Hudson's Straits to the River St. John's which . . . [*as above*] . . . and over all our forts . . . on the coast of Labrador . . ."

III. Proclamation of 7 *October* 1763. Letters Patent under the Great Seal to erect governments ". . . Firstly.—The Government of Quebec, bounded on the Labrador Coast by the River St. John, and from thence by a line drawn from the head of that river, through the Lake St. John, to the south end of the Lake Nipissim . . ." and "to put all that coast, from the River St. John's to Hudson's Streights . . . under the care and inspection of our Governor of Newfoundland."

IV. British North America (*Quebec*) *Act*, 1774. "All such territories, islands, and countries which have since February 10, 1763, been made part of the Government of Newfoundland" were annexed to the Province of Quebec, as established in III.

V. Newfoundland Act, 1809. "Such parts of the coast of Labrador, from the River St. John to Hudson's Streights, and the said Island of Anticosti, and all other small islands so annexed . . . shall be separated

from the said Government of Lower Canada, and be again re-annexed to the Government of Newfoundland . . ."

VI. British North America (*Seignorial Rights*) *Act*, 1825. " . . . so much of the said coast as lies to the westward of a line to be drawn due north and south from the bay or harbour of Ance Sablon, inclusive, as far as the 52nd degree of north latitude, with the Island of Anticosti and all other islands adjacent to such part as last aforesaid of the coast of Labrador, shall be . . . re-annexed to . . . the said province of Lower Canada . . ."

VII. Order in Council, 1880. " From and after the first day of September, 1880, all British Territories and Possessions in North America not already included within the Dominion of Canada, and all islands adjacent to any of such territories or possessions, shall (with the exception of the Colony of Newfoundland and its dependencies) become and be annexed to and form part of the said Dominion of Canada . . ."

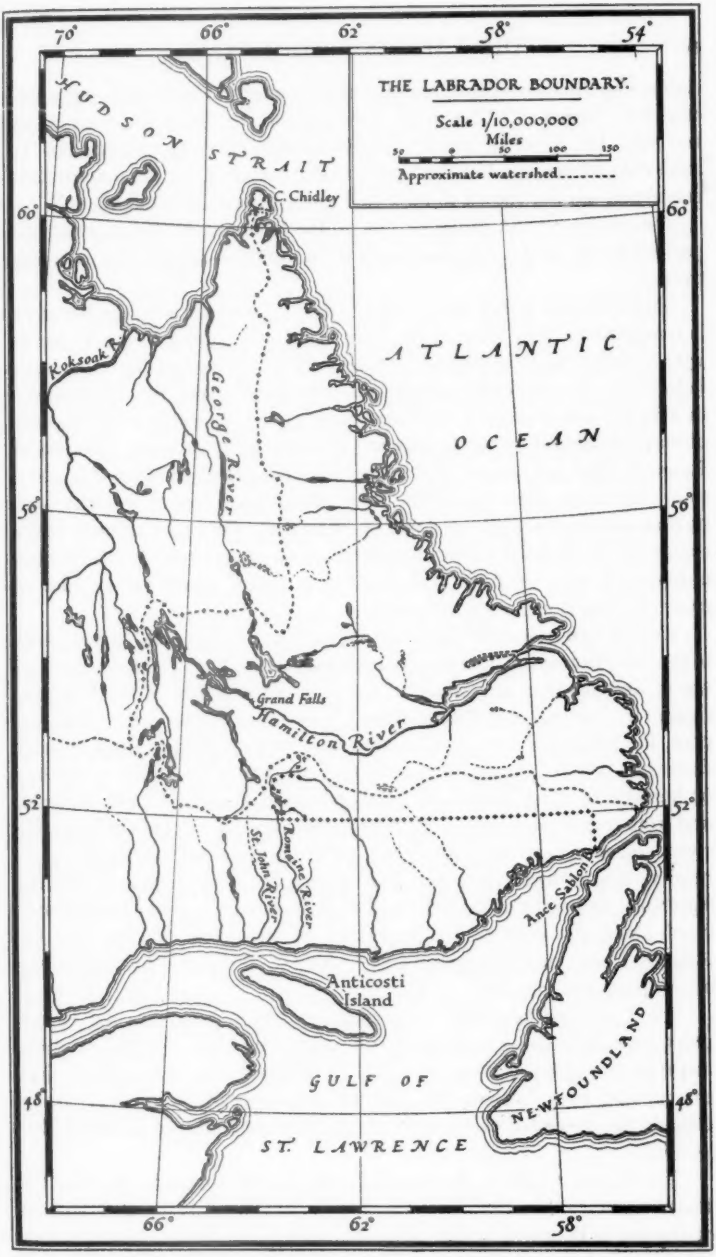
Upon these documents of title Canada suggested that the boundary should be drawn 1 mile from the sea-coast of Labrador; and Newfoundland that it should be drawn due north from Ance Sablon to the 52nd degree of north latitude, and thence along the Atlantic watershed to Cape Chidley. Between the two lines was 100,000 square miles of territory, most imperfectly explored and mapped, as may be seen from Mr. Frissell's paper in this *Journal* for April last, but including very valuable forests and water-powers.

It is hardly possible to summarize the clear and concise arguments of the judgment, which should be carefully studied in the original. We have been promised for the Library of the Society the complete cases of both sides, the verbatim record of the proceedings, and the full text of the report; but they are not yet available. The present account of the matter is therefore based upon the nearly complete account in *The Times* of March 2. Before examining the award we should note the following *dicta*.

On the use of the word " coast ": " It is plain that the word is susceptible of more constructions than one, and that its precise meaning must depend on the subject and context;" and " With regard to the limit in depth of the country which may be described as ' coast,' where that term is used in the wider sense, it is argued that the natural limit is to be found (in the absence of special circumstances) in the watershed which is the source of the rivers falling into the sea at that place; and there is much to be said in favour of that view."

On the argument that the motive of the grant of the Labrador coast to Newfoundland was to give control of the fisheries: " Although this was the principal motive of the annexation, it does not follow that it was the measure of the grant."

On certain maps prepared by officers of the Canadian Government in 1855, 1871, and 1873, which showed the boundary substantially as



Sketch-map of Labrador to illustrate the Boundary Award: the approximate watershed from the maps showing the surveys of Mr. A. P. Low

claimed by Newfoundland, and might be thought to give away the whole case for Canada: "The maps here referred to, even when issued or accepted by departments of the Canadian Government, cannot be treated as admissions binding on that Government; for the departments concerned are not shown to have had any authority to make them."

On the river of St. John's: ". . . the line must be drawn along the parallel as far as the supposed river of St. John's—namely the Romaine river."

This declaration that the St. John's river is confused with the Romaine is remarkable. The river of St. John is shown on John Roque's map of 1763 precisely as it is defined in the Order in Council of the same year, falling into the sea nearly opposite the west end of Anticosti. It is shown in Mitchell's map of 1775, in Arrowsmith's of 1834, and in a whole series of maps published by the Canadian Government up to 1926. The name Romaine does not appear on the earlier maps, but on the later it is given to a larger river than that of St. John, discharging east of the latter and by no means opposite the west end of Anticosti. There is not much in the report of the Judicial Committee to show on what grounds the identity is assumed, and we must wait for the verbatim report of the case to clear up what is at present a mystery.

We may now proceed to the judgment, and trace the ground of each point in the definition of the boundary, which runs thus: ". . . their Lordships are of opinion that, according to the true construction of the Statutes, Orders in Council, and Proclamations referred to in the Order of Reference, the boundary between Canada and Newfoundland in the Labrador Peninsula is a line drawn due north from the eastern boundary of the bay or harbour of Ance Sablon as far as the 52nd degree of north latitude, and from thence westward along that parallel until it reaches the Romaine river, and then northward along the left or east bank of that river and its head waters to their source and from thence due north to the crest of the watershed or height of land there, and from thence westward and northward along the crest of the watershed of the rivers flowing into the Atlantic Ocean until it reaches Cape Chidley. They will humbly advise his Majesty accordingly."

The "eastern boundary"—or perhaps better *extremity*, for it is a point here defined—is required by the word "inclusive" in VI., and the meridian through the point to 52° N. comes from the same act, as does the parallel of 52°, since the part of the coast re-annexed to Lower Canada lay westward of the segment of the meridian terminated at that parallel.

The boundary along the parallel stops at the Romaine because the Board assumes that Romaine=St. John's, and by III. the Government of Quebec is bounded by the River St. John to its head. Why the new boundary is taken along the east bank of that river is not clear, since if Quebec was bounded by the river it would seem that the boundary of

Quebec was on the west bank; while in any case it is usually judged better to take the thalweg or else the median line of a river for a boundary.

From the head of the Romaine the new boundary is taken due north to the watershed, and it is not made clear upon what document of title this is based, since in III. the boundary of Quebec goes from the head of the St. John not north but westward through a certain Lake St. John to the south end of a Lake Nipissim, and the same reasoning which made parallel 52° the boundary might apparently with greater weight have made the above defined line a further section of the boundary. Perhaps, however, the difficulty of deciding which lakes are meant precluded this solution. As it is, the boundary goes north from the head of the Romaine to the "crest" of the St. Lawrence–Atlantic watershed, and thence along the Atlantic watershed to Cape Chidley.

The location of the boundary thus delimited will not be easy. No one, we think, has determined the head of the Romaine, but by Indian report (see A. P. Low, "Report on Explorations of the Labrador Peninsula, 1892–5," Geol. Surv. Canada, Annual Report, 1895, p. 168) it comes from a lake lying close to the height of land, and there is always a possibility that such a lake drains both ways. The only map which purports to give even an approximate location of the watershed is that of Low, which is not included in the Canadian Atlas accompanying the case, and is not mentioned among the maps referred to in the judgment, though the first map in the Canadian Atlas is apparently based upon it. That map shows an approximate line for the watershed meandering among the complicated lakes proper to a recently glaciated plateau. Those who will search for the crest of such a watershed will be apt to meet with disappointment. But there is a tradition in North American boundary-making which seems to demand a remorseless attention to the strict letter of the definition of the boundary without much regard either to cost or convenience. It is therefore unfortunate that the delimitation made by the Judicial Committee, upon refined interpretations of very vague documents, should in the absence of any accurate map necessarily leave open considerable questions of location. It will probably prove of great advantage to both sides if before the boundary is surveyed and demarcated they can agree to a certain elasticity in interpretation, perhaps under an impartial and neutral Chief Commissioner: otherwise the search for the "crest of the watershed" may prove unnecessarily long, expensive, and irritating.

A. R. H.

ICELAND IN 1872 AND 1926

J. H. Reynolds

Note on pronunciation of names.

The principal points in the pronunciation of Icelandic are: á = au (German), æ = ai (as in *aisle*), au = öi (diphthong), ei and ey = ei (as in *rein*), í and ý = ī (as in *marine*), ú = ū (as in *rude*), fn = bn, hv = kw, j = y (consonant), ll = tl (as in *Scotland*), ng = ng + g (as in *finger*), pt = ft, rn = rdn, tt = kht (Gaelic and German cht), th (properly written þ in Icelandic) is pronounced as in *thick* and can only begin a syllable, ð is pronounced as th in *bathe* and can never begin a syllable. The stress is nearly always on the first syllable.

THE first of the delightful *Memories of Travel* collected and published after Lord Bryce's death recalls a visit he paid to Iceland with Sir Courtenay Ilbert and Sheriff Aeneas Mackay as long ago as 1872. He himself admits a doubt whether his view of the country and people will coincide with those of other travellers. After the passage of more than half a century and perhaps a visit to another part of the island he would have been the first to revise his *Impressions*.

Landing at Seyðisfjörður on the east coast he rode by Mývatn to Akureyri, and thence southwestwards by a little-used route to Hvítárvatn and the Geysirs, where he was on what is now regarded as the tourists' round from Reykjavík to Thingvellir and Hekla. His whole journey, therefore, was out of sight of the sea, and it is the great central desert that dominates his description of the scenery. His picture of unmitigated and almost colourless sterility may convey a discouraging impression to the visitor who proposes to limit his travels to the coastal regions. With a good service of coasting steamers, there is now little to take the ordinary tourist across the barren wastes of the interior, where the expense of travelling is considerably increased by the necessity of carrying fodder for the ponies, not to mention complete camping outfit and commissariat. It is possible to travel " light " on a pilgrimage to the historic sites and picturesque scenery of the west coast, finding good or tolerable quarters at the parsonages and farms, where you may be certain of receiving the same genial and dignified hospitality that Lord Bryce ranked with the grimness of the scenery as the outstanding feature of the country. Such a journey in 1926 leaves a rather different impression from that made on his mind by the adventure of 1872.

Along the western shore the indentations of the coast, and in Breiðifjörður the countless islands, make for variety in the landscape, while the mountains exhibit a greater diversity of form than in most parts of Iceland. Lord Bryce mentions the two typical shapes, tabular and conical. A fine example of the former is the flat-topped Skarðsheiði with its 6 miles of unbroken precipice facing north over the Borgarfjörður district and the sharp edge of the Heiðarhorn, 3172 feet (often wrongly called the Skessuhorn, which is the highest point, 3461 feet, at the west

Head of Kolgrafafjörður, Snæfellsnes. Pass of Tröllaháls behind. New snow

Hafnarfjall, Borgarfjörður. Skarðsheiði behind. New snow

Snæfellsnes Range, Álptafjörður and Vigrafjörður from Helgafell near Stykkishólmur

Reykjavík from Ingólfur Statue

Hafnarfjörður. Fish-drying ground on right

Stykkishólmur from New Pier

end of the range) standing out prominently at right angles to the main cliff. Of the conical type there are perfect examples in Baula, 3064 feet, standing conspicuously over the broad plain of the Norðurá and its sister rivers, and Keilir, 1243 feet, a well-known landmark in the middle of Reykjanes. But of quite a different type is the long range that forms the backbone of Snæfellsnes. Here may be found sharp peaks and ridges in size and shape not unlike the Coolin in Skye. Hafnarfjall, which rises from Borgarfjörður to a height of 2769 feet, also shows a picturesque group of peaks forming a striking contrast with the long straight line of Skarðsheiði behind.

As to colour, the black and green of the basaltic hills that Lord Bryce found so monotonous, is relieved by browns and purples in these western coastlands. The writer cannot speak of the flowers of spring and summer; but the autumn tints on a bright day in late September which turned the otherwise gloomy plain of Thingvellir into a sea of beauty will not soon be forgotten. The most brilliant colours were taken by the small blaeberry plants; but there is also in the plain a large area of birch scrub which displayed a charming variety of browns and yellows.

Lord Bryce lays great stress on the isolation of Iceland. In 1872 apparently the only connection with the outside world was a single steamer that arrived six times a year. Now, besides a Danish service about every three weeks which generally includes Leith and the Færoes, the Icelanders have their own vessels, well appointed and seaworthy, though of small tonnage, plying from Reykjavík direct to Leith or Hull about every three weeks, and a rather larger boat that takes a route round the north and east coasts about every six weeks. The well-known *Bergenske Dampskibsselskab* also sends a boat from Norway round the north coast to Reykjavík nine times a year. A coasting vessel is constantly going round the island in alternate directions, taking eleven days over the circuit and making seventeen trips a year. Add to these an occasional liner with tourists from America, and it will be seen that nowadays Iceland is by no means so detached from the outer world as it seemed to Lord Bryce in 1872. It may be added that there is a new harbour at Reykjavík, and ships now come alongside the quay instead of having to discharge their passengers and cargo into small boats.

Lord Bryce would not have recognized the capital to-day. From a mere village of 1800 people it has grown to a city of over 20,000, roughly one-fifth of the total population of the country; and building is in progress on all sides. A handsome stone erection houses the National Library and Museum, while the *Einar Jónsson* Sculpture Gallery is a striking design in concrete. The nation has given this artist a house and studio attached to the gallery where his work is exhibited. His bold statue of Ingólfur Arnarson, one of the first adventurers from Norway who came to land here in the year 874, crowns a green hillock that looks over the harbour to the ice-capped Snæfellsjökull, 70 miles away across the great

gulf of Faxafloi. It contrasts strangely with the prim figures of King Christian IX. and other modern celebrities that stand forlornly about on pedestals at the bottom of the hill.

Reykjavík is a place of contrasts at the present time. Substantial modern buildings and dilapidated hovels are jumbled together. The silversmiths carry on their beautiful filigree work in little out-of-the-way shops, which escape notice among the up-to-date stores and banks of the main street. The sturdy little Icelandic ponies are being ousted by hooting motor-cars. Women in the rather sombre native costume with festooned plaits of hair walk arm-in-arm with young ladies with shingled heads and pink stockings. Opposite the Museum with its relics of the saga period there is rising a new picture-theatre, though one already exists and was showing *Charley's Aunt* last September. The wireless station appears to broadcast weather forecasts—an even more thankless task than in England—and jazz music, the latter from the dance-room in the Hotel I'sland. There is talk of rebuilding this hotel on modern lines. The whole city would benefit by a good tidy up; but progress is being made in this direction. Streets are being repaved, and a small park is being laid out at the far end of the Tarn (Tjörnin). A striking feature in the capital is the complete absence of dogs, which were recently abolished by law, those that were not sent into the country having to be destroyed.

There is electric light everywhere in Reykjavík, the power station being situated on the river Elliðaá, 3 miles to the east on the Thingvellir road. As the water-power obtainable there is rapidly becoming inadequate for the needs of the city, there is a proposal to harness the beautiful falls on the Andakilsá, the river that drains the 10-mile-long lake Skorradalsvatn into Borgarfjörður. Iceland has enormous stores of power in her great waterfalls. It is curious that Lord Bryce makes no mention of these, though he cannot have been far from the Dettifoss and the Goðafoss on his ride from Seyðisfjörður to Akureyri, and probably passed the Gullfoss when he made the ascent of Hekla from the Geysirs.

Lord Bryce knew of no place in Iceland except Reykjavík and Akureyri that deserved to be called a village; but now there are little fishing ports all round the coast. Four of these, Akureyri itself, Kaupstaður in the Vestmannaeyjar, Hafnarfjörður 6 miles south-west of Reykjavík, and I'safjörður in the great north-western peninsula, are larger than Reykjavík was in 1872, while there are over a score of smaller communities with 300–1000 inhabitants. Some of these, like Akranes, stand in terribly bleak and exposed positions on a low shore. Others, like I'safjörður, lie in the shelter of the big firths. Stykkishólmur on the north side of Snæfellsnes, at the end of a flat peninsula—the Thórsnes of *Eyrbyggja Saga*—stands picturesquely round its little haven with a new pier sheltered by the typical basaltic islet of Súgandisey. In all these places, and indeed at many of the isolated farms and parsonages,

the buildings are of corrugated iron—a style of architecture, if it can be so called, which has come and almost gone since 1872. In those days houses were built of sods. A new era of reinforced concrete is now dawning. What would Lord Bryce have said to a concrete farmhouse with central heating near Thingvellir? Or to a substantial three-storied residence in Reykholtsdalur where the neighbouring boiling springs are "laid on"?

It seems probable that more and more use will be made of these gifts of nature throughout Iceland. The old turf-roofed parsonage at Reykholt is heated by steam from the same group of springs which Snorri Sturluson in the thirteenth century turned into his famous Bath that may still be seen—a circular tank of clear tepid water. The bath tradition, by the way, has not survived. At another place in Reykholtsdalur the steam is used to heat ovens for baking bread. Near Reykjavík (which means the Wick of the Reeks) the hot springs have been turned to the homely use of a laundry; and successful attempts have been made to employ them in the growing of vegetables and tomatoes. The famous Geysirs no longer shoot up into the air as they did in Lord Bryce's day. It is doubtful if they were active in the classical period, as they are nowhere mentioned in the sagas. There is said to be a new geysir in Reykjanes.

Lord Bryce wrote that the Icelanders had given up attempts to make roads. He would have been surprised at the distances it is possible to travel to-day by motor-car, or *bíli* (an attractive abbreviation of the word *automobile*), at all events in the western part of the country. From the capital a road runs 70 miles south-eastward into the country of *Njáls Saga*, and is carried over the broad Ölfusá by a suspension bridge. The Thjórsá is also bridged. From this road a branch leads to Thingvellir over dreary Mosfellsheiði, where it is bordered by tall pillars of stones to show the way in winter snow. There are also shorter lengths of road, such as that to Hafnarfjörður, which is much used by motor-lorries. This group of roads from Reykjavík is not yet connected with the group farther north radiating from the port of Borgarnes, which is reached by weekly steamer from Reykjavík. The chief obstacles to road-making in this country are the deep and swift rivers. But on the road running north-westward from Borgarnes these are all bridged as far as Gröf, near Miklaholt, beyond which the road is constructed up to the foot of the Snæfellsnes mountains at Hjarðarfell. On the north side of the range a road comes south from Stykkishólmur; it will not be a task of serious magnitude to join up the two ends by developing into a road the present pony-track over Kerlingarskarð, 1020 feet, one of the few possible routes over this fine range. North-eastward from Borgarnes a road runs up the broad valley of the Norðurá two dozen miles to Dalsmynni, and by 1929 is expected to extend another dozen miles to Fornihvammur. It is now possible to reach Reykholt by motor-car, the rivers Norðurá, Thverá, and Hvítá being all bridged. There is shortly to be a bridge lower down on the Hvítá, below the confluence with the Grímsá, where

the ferry now is ; this will be the first step towards linking up the Reykjavík and Borgarnes road systems. The surface of some of the roads would horrify drivers accustomed to tarmac, and has much the same effect on the traveller as Faxafloi on a rough day has on an unfortunate passenger in the little coasting steamer *Suðurland*. But there is no doubt that the motor vehicle has come to stay in Iceland, though saga-lovers may shudder at the smell of petrol in Almannagjá or at the sound of the klaxon at the home of Egill Skallagrímsson. Proposals have been made to construct a railway ; but with the development of roads and motor-traction Iceland is likely to remain a railwayless land. It may be remarked that the newest roads have sometimes been diverted from the routes indicated on the otherwise admirable Danish map on the scale of 1/50,000, the sheets of which add considerably to the facilities of travel in the western districts.

But perhaps the modern innovation that, even more than the concrete houses and the motor roads, would have surprised Lord Bryce is the telephone. The ramifications of the wire (*sími*) throughout the country are really remarkable ; and farmhouses, otherwise comparatively poor in resources, will often be found to have an installation. The telephone largely takes the place of the post in remote districts, where the postman calls not oftener than once a month. Exchanges are established at some of the larger farms. You hear all the rings that are made on your exchange and only answer when you hear your own particular call—one short and two long rings, or whatever it may be. At least, that is the theory ; but, if you have nothing else to do, you can " listen in " and hear what is going on in the neighbourhood. The traveller seldom arrives anywhere without finding that everybody knows who he is and where he has come from. Incidentally, he is enabled by the telephone to make arrangements in advance about lodging, ponies, etc. He would of course be well advised to do this from Reykjavík, if he is unacquainted with the Icelandic language. The people who can speak English in the capital can no longer be counted on the fingers of one hand, as in 1872. And it is astonishing how many people in the farms know English, at all events for reading purposes, though they may be a little shy of speaking it through lack of practice. English is probably as likely to be understood now by the country parson as the Latin to which Lord Bryce had recourse.

He remarks on the high degree of education in Iceland. The people still maintain their love of books ; and it is noteworthy that the building that crowns the little group of houses at Stykkishólmur is the library of the county (*sýsla*), not the village church. The sole educational institution that Lord Bryce found in Iceland, the *Schola Latina* at Reykjavík with fifty or sixty students, has developed into a University with faculties of Theology, Medicine, Law, and Philosophy. There are plenty of schools both secondary and elementary, the latter being

Foss on the Andakilsá between Skorradalsvatn and Borgarfjörður

Grund; Farmhouse and Telephone-Exchange. Skorradalsvatn and Skarðsheiði behind

Boiling Springs laid on to house in Reykholtsdalur

Setberg Church and Parsonage, Grundarfjörður, Snæfellsnes

Stykkishólmur; Fish-drying Ground. Elliðaey in distance on left

Hvanneyri; School of Husbandry. Skarðsheiði and Brekkufjall behind

either stationary with about six months' teaching or movable with at least two months' instruction from a teacher in each place. Reykjavík has also technical schools; and special mention must be made of the State School of Husbandry (*Búnaðarskóli*) at Hvanneyri on the south shore of Borgarfjörður. Here the instruction is given in the winter months. Hvanneyri has a large *tún* or home-field for hay, supporting a fine herd of cattle, whose yield of milk is carefully recorded daily. In the dairy the famous Icelandic *skýr*, a sort of curds, is made in large quantities and sent to Reykjavík. There are fields of potatoes and turnips; and in the garden even cauliflowers and other vegetables are grown.

It will be realized from the foregoing remarks that many of the negatives which Lord Bryce found to be the best method of describing the conditions of life in Iceland are no longer applicable. One, however, namely "no criminals," is still wonderfully near to the truth; and though the number of policemen in the whole island has increased from one to a dozen, that is roughly in proportion to the growth of population. Iceland is a "dry" country as far as the sale of spirits is concerned; but light wine and beer are imported.

The absence of class-distinctions still happily prevails; and christian names are still used freely between the noblest born and the humblest farm-hand. The use of surnames, which Danish influence had introduced before 1872, has probably not spread to any great extent. In the farms, at all events, a man is still called his father's son and a woman her father's daughter (*dóttir*) even after marriage. Lord Bryce found no titles of respect save *Herra* for the bishop and *Síra* for a priest; but *Herra* now seems to be used as a courtesy title like *Esquire*, *Frú* and *Ungfrú* being the equivalents of *Mrs.* and *Miss*. Courteous manners, unstinted hospitality, and cheerful contentment are still the leading characteristics of the people; they may still have little regard for time, but the listlessness and indifference to squalor, which Lord Bryce noted, have largely disappeared. The political independence (under the King) that was at last won from Denmark in 1918 has marked the dawn of a new era in Iceland. Emigration to Canada, where the Manitoba settlement numbers about 20,000 (with two daily papers in the Icelandic language), has practically stopped; the stream may even begin to flow back again, as it has in Central Europe. Fishing with fish-curing and farming with dairy-work are still practically the only two occupations, and provide the great bulk of the exports to pay for the many imported necessities; but a beginning has been made with the manufacture of woollen cloth. There is, however, no immediate prospect of seeing the land of the sagas dotted with factory chimneys or all the glorious waterfalls desecrated by power-houses. It seems inevitable that Iceland must always remain a backwater of civilization; but it is a peaceful and fascinating backwater that cannot fail to soothe and delight the voyager who puts into it from the main stream.

A NOTE ON THE "QUARTERMASTER'S MAP," 1644

Sir George Fordham

I AM not aware that the history of the above map, in its original and subsequent editions, has ever been discussed, and it may therefore be useful to print a short note on the subject.

The first fact of interest which inquiry has established is that this map, engraved by Hollar, and published by Thomas Jenner, for the use of the Royal and Parliamentary Forces then in the field, was copied almost exactly, so far as the land surface is concerned, from the map of England and Wales issued by Christopher Saxton about 1580–1584 (*Geogr. Journ.*, January 1926) in twenty sheets, the object being to produce a version as compact as possible, for folding into a pocket form. The map is now arranged in six sheets only, one or two of which overlap, and as much as possible of the sea-surface is cut off. This is so much the case that it became necessary to engrave on a small addition plate, 99 × 230 mm., the projecting points of the Land's End area, a minute triangle of the Lincolnshire coast at Mablethorpe, and the Isle of Man, the last following the oval outline adopted by Saxton. Amongst the copies I have seen of the Quartermaster's Map in various collections I have found the plate of the Isle of Man only in two of them, one of which is in the British Museum.

Hollar's plates do not show any roads, and, in fact, he would have found no cartographical materials existing in 1644 upon which to base their insertion. A tall narrow title, separately printed, was issued with this map: "The Kingdome of/England, &/Principality of Wales,/ Exactly Described whith/euery one of them,/in Six Mappes, Portable for euery Mans Pocket./

. . . . . .

Vsefull for all Comanders for Quar/-teringe of Souldiers, & all sorts of Persons, that/would be informed, where the Armies be; ne/-uer so Commodiously drawne before this, 1644/Described by one that trauailed throughout/the whole kingdome, for its purpose./Sold by THOMAS JENNER at the South entrance of y^{e} Exchange,/W : Hollar fecit."

For the surveyor who travelled throughout the whole kingdom we must, obviously, go back to Christopher Saxton himself. In the disturbed condition of the country during the civil war no new survey could have been carried out, and, had it been possible, it would have taken a long period, and have produced considerable departures throughout from Saxton's outlines and details, nowhere observable on a close comparison of the two maps.

There seems to have been an idea prevalent that the "Quartermaster's Map" was specially associated with the Parliamentary Armies and with Oliver Cromwell, as will be noticed on referring to the statement on Rocque's version of the map of 1752. I do not know of any foundation

for such an impression. It is much more probable that this was a commercial venture of Thomas Jenner's, to meet an emergency demand, and that he employed Hollar to work up existing material in as expeditious a manner as possible.

There are two subsequent versions from Hollar's plates.

The earlier one is undated. On the Kent sheet appears: "Printed Coloured and/Sold by John Garrett at the South Entrance/of the Royall Exchange in London." The text of the title slip is varied, war conditions having ceased, to the following: "Vsefull for all Gentlemen and Tra-/vellors and all sorts of Persons that would be/informed of the Distance of Places ne-/uer so commodiously drawne before this," and the insertion of roads is mentioned. This is the only new feature of Garrett's impression. His roads do not follow those drawn on Lea's impression from Saxton's plates, are much less complete, and contain serious errors. For instance, the old North Road (London to York and Scotland) ends abruptly at Royston, to be resumed only at Huntington. It may be assumed that Garrett took his roads independently from John Ogilby's *Britannia*, a source common to Lea and himself.

I have assumed elsewhere 1688 as a probable year of publication for Lea's map, being the last year of the reign of James II., whose initials "J.R." appear above the Royal Arms in the title, but I have since found Lea's entry of the publication in the Term Catalogues, 1687—Trinity Term (June)—so that the map may have appeared a year earlier than I had previously assumed. But 1687, or 1688, will equally well accord to establish contemporaneity with another entry in the Term Catalogues, that of "The Quartermaster's Maps" (so described), by J. Garrett, 1688—Michaelmas Term—as follows: "The Quarter-Master's Maps, Or the Kingdom of *England* and Principality of *Wales*; with the Small Towns, Post-Roads, and Cross-Roads, described: so ordered, as to lye in a Vellum-Case eight Inches long and three Inches broad; with a Letter-case fit for the Pocket. Price 3s.; each Shire divided, 3s. 6d.; Set on Cloath, etc., 11s. Sold by J. Garrett, next the Stairs of the Royal Exchange, *Cornhill*."

The third issue of this map does not appear to bear any sign of alteration from the state of Garrett's plates, and it is only distinguished from his version of 1687 or 8, by the writing, in the sea-space at the foot of the South-West sheet, of the following particulars: "Carte de l'Angleterre et d'une Partie d'Ecosse Gravée par le Celebre Hollar. Cette Carte a ete Réduite d'après les Provinces de Mr Saxton Par ordre d'Oliver Cromwells Pour l'usage de Ses Armées, ce qui fait qu'elle est Réputée pour être la Meilleure de l'Isle: Toutes celles qui ont ete publiées depuis n'en Sont que des Copies. elle est connuë Sous le nom de Quarter Master's Map ou Carte des Quartiers Maitres; les Planches ont ete dans l'oubly pendant plusieurs années par le peu de connissance de Celuy qui le[s] Possédoit. elles ont eté acquises par le Sr J. Rocque Chorographe de

S.A.R. Monseigneur le Prince de Galles, dans le Strand A Londres 1752. le Prix est d'une demy-Guinée ou 12^{H}."

Thus we establish the chronology of the most important of the large-scale maps of England and Wales derivatives of the great work of the Elizabethan cartographer. The value of that work remained unimpeached, it will be seen, for a hundred and seventy years, and it may even not be too much to assert that it was not replaced by any survey of equal magnitude for more than two centuries, and until John Cary published, in 1794, his large and detailed " New Map of England and Wales, with part of Scotland " in 81 quarto sheets and on a scale of 5 miles to the inch, followed, at a long interval, by an equally magnificent map, a reduction from the Ordnance Survey publications, which appeared in 1832 : " Cary's Improved Map of England and Wales with a considerable portion of Scotland," in 65 large double folio sheets, on a scale of 2 miles to the inch. These slight historical details seem much to enhance the importance and interest of the original work of our first national cartographer, Christopher Saxton.

THE RELATIONS OF THE THAMES AND RHINE, AND AGE OF THE STRAIT OF DOVER

Prof. J. W. Gregory, F.R.S.

THE belief that the Thames was once a tributary to the Rhine has long been a widely accepted tradition, based on the facts that the southern part of the North Sea had been a plain inhabited by mammoth and reindeer, and that the faunas of the Thames and Rhine have much in common. Yet the evidence of the faunas is not free from difficulties, to one of which, due to two fish, my attention has been called by the Rt. Hon. Sir Herbert Maxwell. Two freshwater fish—the Burbot and the White Bream—are indigenous only in those English rivers that discharge into the Wash and the Humber ; these fish are found also in the Rhine, but not in the Thames. Sir Herbert Maxwell remarks that " It is hardly possible to conceive any cause that would exterminate these fishes had they once become established in the Thames system." Sir Herbert Maxwell (' British Freshwater Fishes,' 1904, p. 87 ; smaller edition, n.d. p. 87) had once accepted the former presence of the freshwater cod, the Burbot (*Lota lota*, alias *Lota vulgaris*), in the Thames from the identification of the Wandsworth River, mentioned by Leonard Mascall in his ' Booke of Fishing with Hooke and Line,' of 1590, as the Wandle ; but the name, Sir Herbert points out, was no doubt a misprint for Wansford, a locality on the Nene near Peterborough. The White Bream (*Blicca bjoernka*) is confined in England to the rivers from Suffolk to Yorkshire, and lives in Germany (Regan, ' British Freshwater Fishes,' 1911, p. 203). The Grayling (*Thymallus thymallus*) is also found in

the Rhine and in the rivers of the Midlands and some other British rivers; Sir Herbert Maxwell considers that it was probably indigenous in England only in the same rivers as the Burbot and White Bream, and has been spread by man. Dr. Regan regards its distribution as too capricious to be significant, and he tells me that though he has never denied the possible former connection of the Thames and Rhine, he regards their union as doubtful owing to the absence of the Burbot from the Thames.

On asking Messrs. B. B. Woodward and A. S. Kennard for the evidence of the freshwater molluscs on this problem, they are emphatic that both rivers have the same molluscan fauna and must have been joined. Freshwater molluscs, however, often have a wide range, as they may spread from one river basin to the next through shallow streams and pools; hence they do not prove the direct confluence of the two rivers.

The tradition that the Thames discharged northward involves the post-glacial age of the Strait of Dover, as inferred by A. J. Jukes-Browne ('Building of the British Isles,' 3rd ed. 1911, p. 456), from the absence of raised beaches from Kent and Sussex, and from the French coast on both sides of Cape Gris Nez. According to his map (*op. cit.* 1st ed. 1888, pl. xiv. opp. p. 294; absent from 3rd ed. 1911) the Rhine flowed westward from its present mouth, was joined by the Thames off southern Suffolk, and discharged to the Arctic Ocean through an estuary to the east of the Shetlands. Clement Reid ('Submerged Forests,' 1913, p. 40) also accepted the union of the Thames and Rhine at the time of the lowest sub-

I. *Relation of North Sea drainage to Strait of Dover, after Jukes-Browne*

merged forest; but he placed the confluence half-way between north-eastern Norfolk and the Dutch coast, and their discharge into the sea south-west of the Dogger Bank opposite Flamboro Head. Sir Halford Mackinder ('Britain and British Seas,' 1902, p. 141) astutely left the junction of the Thames and Rhine doubtful, and questioned "whether the Rhine received the eastern rivers of Britain, or the Thames was the head of an independent stream"; but, in deference to tradition, his sketch-map (*ibid.* fig. 70, p. 140) joined the two rivers; he, however, adopted for the Rhine a course through the Zuyder Zee, which is more probable than that accepted by Jukes-Browne and Reid.

II. *Relation of North Sea drainage to Strait of Dover, after Clement Reid*

The northern extension of land into the North Sea during glacial times, as shown by Jukes-Browne's map, is probably exaggerated. The positive evidence is that of the fossil mammals, especially mammoth and reindeer, which have been dredged from the floor of the North Sea.* Mr. W. E. Swinton tells me that the Dogger Bank marks their northern limit. Dr. J. Ritchie informs me that none have been dredged east of Scotland. The floor of the northern part of the North Sea yields instead limestones containing many marine shells, which, according to R. B. Newton (*Q.J.G.S.*, 1916, **72**, p. 8), from the fossils in a block dredged 100 miles N.E.$\frac{1}{2}$N. from Buchan Ness, are of Coralline Crag age

* For the literature on this question Mr. Swinton kindly refers me, in addition to the paper by W. Davies, *Geol. Mag.*, 1878, pp. 97–100, 443–4. pl. xii, to H. E. Sauvage, *Bull. Soc. belge Géol.*, 1902, XIII, proc. verb., pp. 59–63; O. Pratje, *Zeit. deut. geol. Ges.*, 1924, LXXVI, Monatsb., pp. 156–64: J. O. Borley, "The Marine Deposits of the Southern North Sea," Fishery Investigations: Ser. II; Sea Fisheries, IV, No. VI, 1923.

and of southern affinities. Newton no doubt laid stress on their southern character to emphasize their difference from the Red Crag ; but as the shells do not include Voluta or the other distinctive Mediterranean Coralline Crag genera, and include Cyprina islandica and the Arctic genus Yoldia, and as those genera that occur in the Mediterranean still live in the British seas, the temperature of the North Sea north of East Anglia was then much the same as at present. The sea must have submerged the southern part of the North Sea during part of glacial times, as walrus bones are associated with those of mammoth and reindeer; and Mr. Swinton tells me that further specimens of walrus have been found recently on the coasts of East Anglia and Holland.

III. *Relation of North Sea drainage to Strait of Dover, after Mackinder*

The discharge of the Thames northward through the Rhine is unnecessary on Prestwich's view that the Strait of Dover was in existence by early glacial times, when drift ice passed through it and carried granite boulders from the Channel Islands or north-western France to the raised beach at Sangatte, east of Cape Gris Nez and a little west of Calais (Prestwich, *Q.J.G.S.*, **21**, 1865, p. 441). He held that the sea occupied the Strait of Dover, probably during the deposition of the high-level gravels (older Paleolithic) and certainly in the time of the lower gravels (J. Prestwich, *Phil. Trans.*, **154**, 1864, pp. 301–2). That the Strait of Dover is of some geological antiquity Prestwich maintained from the absence from England of two snails, *Pomatias obscurus* and *Clausilia plicatula*, which are found recent and fossil in Northern France. Mr. B. B. Woodward kindly tells me that these two shells have not been found in England, a fact which he attributes to their

sluggish habits. Prestwich also inferred that the French coast extended north-eastward from Sangatte from the presence there of Lower Greensand Chert from Kent; he thinks this material must have drifted along a coast (Prestwich, *Q.J.G.S.*, **22**, 1865, pp. 440–2).

According to Jukes-Browne, on the other hand, in glacial times a ridge of land traversed the Strait of Dover; Clement Reid, in agreement with Prestwich, recognized that in early glacial times the strait was a valley occupied by the sea (*op. cit.* 1913, p. 68); but later on the area was raised and Kent was joined by land to France. The view that there was a discharge southward through the Strait of Dover in glacial times is emphatically claimed by Prof. P. K. Kendall ('Handb. Reg. Geol.; Brit. Isles,' 1917, p. 323), who rejects Reid's view as "highly improbable."

The Strait of Dover is probably an ancient valley. Prof. Fearnsides ('Geol. in Field,' Geol. Assoc., 1910, p. 820) refers to it as "simply an Eocene or later erosion channel." It must have been closed in the Miocene, when a mountain range rose above the Weald of Kent and was continued eastward into France and Belgium. While this Miocene range was in existence its northern drainage must have found its way to the Arctic Ocean, either independently or after union with the rivers from Holland and Northern Germany. Shortly afterwards in the early Pliocene, the Strait of Dover must have been submerged, for during the Coralline Crag a warm sea spread over the southern part of the North Sea; this sea must have been protected from cold northern water, as warm-water Mediterranean shells lived as far north as Suffolk; a ridge from East Anglia to Germany would account for the presence of such shells as Voluta in Suffolk. The succeeding Red Crag sea was colder and was doubtless closed to the south and open to the north, for the beds of that age in Suffolk and Essex have many northern shells.

During this oscillation the Thames and Rhine must have had independent outlets to the sea, and the problem is whether the two rivers were joined after the retreat of the Crag seas in glacial times. The ancient river that crossed Suffolk and Norfolk in late Pliocene and early glacial times has been generally regarded as the estuary of the Rhine. The evidence for this view is inadequate, as the stones regarded as derived from the Continent may have come from the west. To bring the Rhine across the southern end of the North Sea into East Anglia assumes complicated changes of level and slope. The southern end of the North Sea has probably been a depression since early in the Pliocene, and the rise westward to East Anglia would have kept the Rhine out of England. Professor Boswell, in answer to an inquiry as to the relation of the Pliocene East Anglian rivers, remarked that their evidence is as consistent with the discharge of the Thames to the English Channel as with that to the North Sea.

As the zoological evidence whether the Thames passed through the Dover gap or joined the Rhine is conflicting, it should be remembered

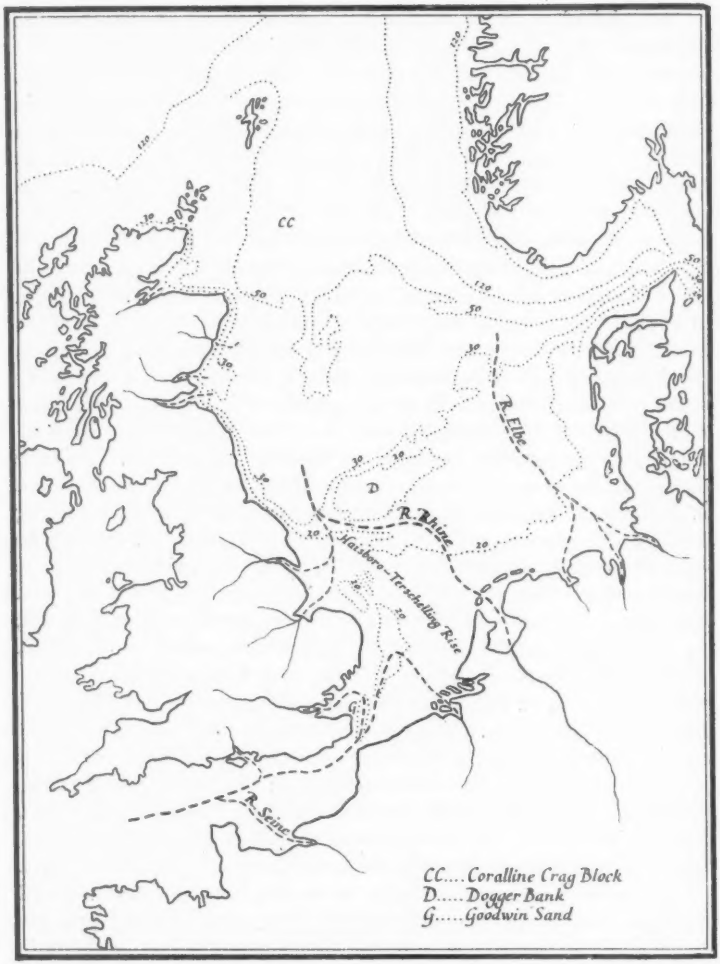
that the geological case for the recent formation of the Strait of Dover depression is weak. The existence of a ridge across the southern part of the North Sea extending from North-East Norfolk to North Holland is more probable.

The undulations on the floor of the North Sea south of a line from the Humber to the northern point of Holland are largely due to the tidal currents, and may be different from the relief before its submergence. The Admiralty Charts warn mariners that owing to the rapid changes in the banks the buoys have to be shifted without notice, and some of them cannot be relied upon to keep their precise positions. Hence the present banks may be a very imperfect guide to the relief in glacial times. The ridges known as "the Falls" and the Gallopers across the Thames estuary are probably modern tidal formations. The floor of the North Sea, south of a line from the Humber to Heligoland, is a plain most of which is between 12 and 16 fathoms deep; on it is a long narrow trench, in one place 36 fathoms deep* (*vide* Admiralty Chart 2182A), from the Strait of Dover to opposite Harwich; a larger depression, parallel to the former and with a very sinuous margin, extends from the northern entrance to the Strait of Dover to opposite Northern Norfolk. The northern part of this submerged plain is a broad "rise," to use the term adopted by Sir John Murray for a low ridge on the sea-floor. This rise extends at the depth of about 12–17 fathoms from the north-east coast of Norfolk at Haisboro, past the Haisboro Banks to the Terschelling Bank, and continues past the Borkum Flat to Heligoland. It may be referred to as the Haisboro–Terschelling Rise. This rise separates the southern depressions from the deeper northern part of the North Sea. The western end of this rise contains the depressions the Sole Pit, 50 fathoms, and the Inner Silver Pit, 53 fathoms, both off the Humber. North of the rise the sea deepens to the depression which includes the Outer Silver Pit, 52 fathoms, and separates the western end of the rise from the Dogger Bank. This rise may perhaps have been piled up by the tidal current sweeping from Yorkshire eastward to begin its return journey northward up the continental coast; but the direction of the rise is not that of the banks now being formed on it by tidal action. The rise is more probably an old formation that once extended as a land barrier across the southern part of the North Sea from Norfolk to Holland.

The existence of this rise helps to explain some puzzles in glacial geology. Mr. James Phemister (*Geol. Mag.*, 1926, pp. 433–454) has recently summarized the distribution of the Scandinavian boulders in Eastern England. These rocks come from the coasts of the Christiania fiord or from Scania, the low-lying south-eastern province of Sweden;

* Chart 2182A. Southern part of the North Sea (1920, corrected to 1927) records a depth of 36 fms. due east of Ramsgate and just west of the South Falls. The larger scale chart, Dover and Calais, 1406 (1920, corrected to 1927) gives the depths there as 26 and 28 fms. The 36-fm. record may be a misprint.

the glacial drifts in Denmark and Northern Holland include rocks only known *in situ* on the bed of the Baltic. As these boulders were carried horizontally, and the ice had no gradient down to the west, drift ice



IV. *The North Sea with the Thames and Rhine separated by the Haisboro-Terschelling Rise*

appears the more feasible means of their transport. Mr. Phemister's map and list shows that these rocks do not occur in East Anglia east of a line from a little east of Cromer past Norwich and Haverhill on the

western edge of Suffolk. They are also absent from Essex, and the records of Scandinavian rocks (Rev. A. W. Rowe, *Q.J.G.S.*, 43, 1887, pp. 357–359) from Felsted are based on rocks which might have come from Scotland; the two distinctive Scandinavian rocks, rhomb-porphyry and laurvigite, have not been found in Essex. Rhomb-porphyry occurs along the valley of the Cambridge Ouse, in Hertfordshire, and as far south as Finchley, in the north-west of London. The drifts in Essex and the valley of the Stour received rocks from the north; so that the Haisboro–Terschelling Rise was not an effective barrier against the southern movement of ice throughout the whole of the glacial times; but the absence of Scandinavian rocks from eastern Norfolk, Suffolk, and Essex would be explained by the existence of the Haisboro–Terschelling Rise during the arrival of the ice from the Christiania Fiord and the Baltic. This rise would have directed the Thames to the Strait of Dover. The Rhine would probably have passed through the Zuyder Zee and the Outer Silver Pit and have been joined by the rivers from the Wash and the Humber; and the united river would either have entered the sea near the Dogger Bank or flowed across the plain to the Norwegian Trench. In either case it would not have been connected with the rivers of Scotland. Dr. Regan has pointed out ('British Freshwater Fishes,' 1911, p. 270) that the Highland rivers have such a scanty freshwater fish fauna that they cannot have been connected with the Rhine or the rivers of North-Eastern England at any period after the major glaciation of Scotland. Dr. Regan suggests that the land extended seaward only to the 40-fathom, and not to the 100-fathom line. This limitation of the North Sea land is fully consistent with the geological evidence, with the Pliocene age of the Strait of Dover, and with the junction of the Rhine and the rivers from the Wash and from Yorkshire, and with the separation of the Rhine from the Thames and the rivers of Scotland.

NAMES ON THE ADMIRALTY CHARTS OF THE SOLOMON ISLANDS

AT the conclusion of his paper "Notes on the Solomon Islands" in the *Geographical Journal* for December 1926, Mr. C. M. Woodford appealed to the Hydrographer to the Admiralty to amend the positions allotted on the charts to the names Eddystone Rock and Cape Satisfaction, given by Lieut. John Shortland in 1788. The name Eddystone is at present an alternative to Narovo Island, and Cape Satisfaction is applied to the south end of Ganonga (Ronongo) Island. Mr. Woodford pointed out that, from Shortland's account, the Eddystone was a rock to the south (more correctly, west of the south end) of Narovo Island, Cape Satisfaction was the southern point of Narovo Island, and Narovo

Island itself was "The Two Brothers." The Hydrographer at once examined the question, and ultimately accepted Mr. Woodford's emendations. The following note summarizes the grounds for this decision.

The circumstances of the naming of these features are set forth in this extract from the account of Shortland's voyage from Port Jackson to Batavia in 1788 from 'The Voyage of Governor Phillip to Botany Bay,' etc. (London, 1789).

(5 August 1788) "At the same time, Cape Deception bore north-east four or five leagues distant; and two remarkable hills from their similarity called the Two Brothers . . . bore north-west half north, distant ten leagues. At three in the afternoon they bore away for the Two Brothers, which at six bore north-west by north, distant seven leagues. At eight the ships lay to for the night. At five o'clock in the morning of Wednesday August 6th they made sail again to the north-west and at eight discerned a rock which had exactly the appearance of a ship under sail, with her top-gallant sails flying. So strongly were all the *Alexander's* people prepossessed with this imagination that the private signal was made. . . . This rock bore from the Two Brothers south south-west, distant one league. . . . At noon a point of land which runs from the Two Brothers and was now named Cape Satisfaction bore north north-east, and the rock which had been mistaken for a ship was called the Eddystone and bore north by west, distant four leagues. The Eddystone bears from Cape Satisfaction south south-west, distant two leagues. As the land from Cape Satisfaction began to trend northward Lieut. Shortland again entertained hopes of finding a passage" (pp. 196–7).

This statement does not entirely solve the points at issue. If the bearings given in the above extract from the Journal are plotted, they are found to be not only inconsistent with each other, but also with Shortland's own charts. Further, if it is assumed that the two peaks near the south end of Narovo Island are Shortland's "Two Brothers," no positions can be found on the charts for Cape Satisfaction and Eddystone which accord to any degree with his bearings and distances. It appears certain, however, that Narovo Island is Shortland's "Two Brothers." Mr. Woodford writes: "Approaching Narovo Island from the south-east, the two peaks of the island, one 1100 feet and the other 1025 feet, according to the survey of Lieut. Oldham of H.M.S. *Lark*, appear first at a distance as two separate islands. As there is no other land very near to then, their appearance is arresting and Shortland's name of the 'Two Brothers' seems appropriate. Upon a closer approach the lower land comes into view and ultimately the rock which Shortland mistook for a ship under sail. In Shortland's time it seems the rock bore some vegetation, and must have been more conspicuous than at present, but even now the black pointed pinnacle of rock which suddenly appears clear of the end of Narovo Island with a clear horizon behind it is an object which at once arrests the eye." If the "Two Brothers" is identified as

Narovo Island, then the approximate positions of Cape Satisfaction and Eddystone Rock are clear.

In spite of the inconsistencies of Shortland's observations, the Hydrographer also concluded, though upon other grounds, that the names should be applied as Mr. Woodford contends. He based his conclusion largely upon Charts Nos. 23 and 24 in the Atlas accompanying the Voyage of Bruny-D'Entrecasteaux (Paris, 1807). These charts, made in 1792, refer especially to Shortland's work, and may be accepted as practically contemporary evidence. On them the Eddystone is shown as a rock to the west of the south point of an island, marked Cape Satisfaction. If Shortland's charting of Bougainville Strait and its neighbourhood is compared with the modern chart, it will be seen how the mistaken identification may have occurred. His east longitudes have to be reduced by about 22′, but it is difficult to determine a consistent correction for his latitudes. When the former correction is made, the likelihood of the mis-identification of Mount Tuara and Mount Kela on Ganonga (Ronongo) Island with the "Two Brothers" is apparent, and, consequently, the application of the name Cape Satisfaction to the southern point of Ganonga. This confusion arose as early as 1844.

The Hydrographer has therefore decided to amend the Admiralty charts as regards these two names: that is (1) the southern point of Navoro Island will be called Cape Satisfaction; (2) Eddystone Island will not be used as an alternative to Narovo Island, but will be applied to the rock west of the south end of that island. . That Narovo Island had erroneously been called Eddystone Island was pointed out by Dr. W. H. R. Rivers in the *Geographical Journal*, 39, 1912, p. 460, where he refers to H. B. Guppy's 'The Solomon Islands and their Natives' (London, 1887) for a history of their nomenclature.

THE EARLY MAPS OF SCANDINAVIA

Atlas Danicus III. B. : Bornholm.— Peder H. Resen. I dansk oversaettelse ved **Johannes Knudsen.** København: G. E. C. Gads Forlag. 1925. 7 × 10½, pp. xv. + 86. *Woodcuts and Nine Maps.* 10*s. net.*

Two Cartographers, Guðbrandr Thorláksson and Thoðrur Thorláksson.— Hallidór Hermannsson. (*Icelandica*, vol. 17.) Ithaca, New York: Cornell University Library. 1926. 9 × 6½, pp. 44. *Ten Maps and Two Illustrations.* $2.

And other sources.

THE *Atlas Danicus* is a detailed topographical and historical description of the whole kingdom of Denmark, which Resen, with the help of numerous correspondents and assistants, compiled between 1667 and 1686. His object was to do for Denmark what Caspar Danckwerth and Johannes Mejer had done for Schleswig-Holstein in their *Newe Landbeschreibung der zwei Herzogthümer Schleswig und Holstein* (Schleswig, 1652); but political considerations and other reasons prevented the publication of the work. The

Atlas exists in three manuscript "states," for the first version proved too voluminous, and Resen had two condensed versions of it made by men of finer literary ability than himself, chief among whom was Johan Brunsmand. Only the sections on Samsø and Copenhagen were printed, in 1675 and 1677; there is a copy of the latter in the British Museum. The main manuscript of the work was destroyed in the great fire at Copenhagen in 1728, but Mr. Knudsen shows that one manuscript of the whole and several of the parts still exist in Denmark. He has here translated the section dealing with Bornholm from the original Latin, and published it in the hope that it may arouse sufficient interest to make the publication of the whole work worth while.

Mr. Knudsen has chosen well, for this remote outlier of the Danish kingdom is little known except as a holiday resort. While Bornholm is only 23 miles from Sweden and about 60 from Rügen, it is over 100 miles from Copenhagen; but in spite of overwhelming temptations to belong to Sweden or to Lübeck, the islanders have always been steadily loyal to Denmark. It is now the only remnant of the old Danish province of Skåne and Bornholm.

Mr. Knudsen has published all the maps and woodcuts which Resen had collected to illustrate this section of his work, including a good map of the island engraved by Johan Husman. As the editor points out, this is almost a copy of the map made in 1676 by Bagge Wandel. Wandel, who was Director of the Danish School of Navigation and one of the earliest Danish chart-makers, was sent in that year to report on Bornholm as a possible naval station; his report is printed here as an appendix. The eight small maps, chiefly plans of towns, are very interesting but not very accurate in orientation. The woodcuts of rune-stones are copied from Wormius. The copper-plates of all the maps perished in the fire of 1728.

Important as old Resen's work is for Danes, its interest will always be mainly local and antiquarian. In the historical section of the present extract the author is almost as much concerned with omens and portents—three-headed calves and bloody rains—as Livy was. Mr. Knudsen has chosen a patriotic task and performed it very well.

Mr. Hermannsson's book on the two Thorlákssons Bishops is a very useful contribution to the history of Icelandic cartography, based to a great extent upon a study of unpublished manuscripts and maps at Copenhagen. He studies the Thorlákssons' maps as part of their life-work and as the result of contemporary influences, and traces their development from the earliest stages until publication. His criticisms are rendered more valuable by his thorough knowledge of Icelandic topography. G. Thorlákssons has always had credit for his map in Ortelius' *Additamentum* of 1590, but it is perhaps not so generally known that this map was the basis of Mercator's Iceland of 1595. Although he has confined himself to the work of the Thorlákssons and their editors and emendators, Mr. Hermannsson has contrived to review most of the important maps of Iceland between 1482 and 1700. His comment on Flandrus' popular map is severe but timely.

A special section is devoted to Greenland. The cardinal mistake of placing the eastern—or rather, southern—settlement of the Norsemen on the east coast of Greenland, which first appeared in Joris Carolus' map of 1634 and was handed on by T. Thorlákssons and Torfaeus, with disastrous consequences to some expeditions, is traced through its phases for two hundred years. For the sake of its fine reproductions of maps alone this book is worth having.

Mr. Hermannsson may be regarded as a modern and scholarly disciple

of C. U. D. Eggers, whose review of maps of Iceland and Scandinavia in his *Physikalische und statistische Beschreibung von Island* (Kopenhagen, 1786) was a remarkable production for its time. As far as Swedish cartography was concerned, Eggers' work owed much to a monograph written by Jacob Faggot as early as 1747.* Both these works are still useful, for in spite of the valuable contributions to the history of Scandinavian cartography published in the last sixty years by many scholars, among whom Resen's editor Mr. Knudsen is not the least, there is need for a book which will survey the subject from 1427 to 1800.

The Clavus type of Scandinavia, which had a great influence upon manuscript maps and was published in the 1482 (Ulm) Ptolemy, went out of favour early in the sixteenth century. For Scandinavia on his earliest known maps Mercator used a variety of sources, chief among them being Olaus Magnus' *Carta marina* of 1539 for the general type of the Peninsula and for divisions of the interior, Dutch and Hanseatic sea-books and charts for the waterways and coasts, and Ziegler's *Schondia* (1532) for names. For Denmark, the southern Peninsula, and the surrounding waters, there is no doubt that the map which we now associate with Cornelis Anthoniszoon, the *Caerte van Oostlant*, established a type which had a remarkable influence. It is found, with small alterations, in Mercator's 1554 *Europe*, his 1569 *World*, and his world, Europe and *Suecia et Norvegia cum confiniis* of the Atlas of 1595 and later editions; it was copied in the maps of Tramezini (1557, 1558), Zeno (1558), and Camocius (1562); it appears, very slightly changed, as the map of Denmark in all Ortelius' atlases, with the author's name given as Cornelius Antoniades on all but the earliest editions, and is the type of Denmark on all Ortelius' maps of the World, Europe, and Scandinavia; it corresponds at all points with the obscure *Sydskandinaviskt sjökort* which Ahlenius shrewdly surmised to be at the back of many sixteenth-century maps,† and is revealed as the map which Erslev thought to be a copy of Jorden's lost map of Denmark.‡ The one copy known, a printed copy in nine sheets found at Helmstedt in 1903, bears Anthoniszoon's name but no date.§ Apart from Ortelius' statement (Catalogus Auctorum) that Anthoniszoon printed a map of Denmark and neighbouring regions at Amsterdam, the evidence recently produced by Dr. C. P. Burger to show that the original of the Helmstedt map was made by Anthoniszoon at Amsterdam in 1543 to accompany a sea-book ‖ disposes of all rival theories as to its authorship. It is clear that Anthoniszoon was for some years an experienced navigator before he settled down at the Sign of the Writing Hand in Amsterdam to earn fame as an engraver. Investigation into the relations of both Ortelius and Plantijn with Jacobus Bossius "Belga" of Rome, who engraved the Tramezino imitations of this map, might throw further light on the subject. Bossius, or Bussius, engraved many northern

* 'Historien om Svenska Landtmäteriet ock Geographien,' etc. Stockholm, 1747.

† K. Ahlenius, 'Till kännedomen om Skandinaviens Geografi och Kartografi under 1500-talets senare hälft." (K. Humanistiska Vetenskaps-Samfundet i Upsala, Skrifter, VI. 5.) 1900.

‡ E. Erslev, 'Jylland, Studier og Skildringer til Danmarks Geografi.' Kiøbenhavn, 1886. Pp. 118 *et seq.*

§ Reproduced, reduced, in A. A. Bjørnbo and C. S. Petersen, 'Anecdota Cartographica Septentrionalia.' Hauniae, 1908.

‖ Introduction to Johannes Knudsen, "Het Leeskaartboek van Wisbuy. Uitgegeven door J. Knudsen met inleiding door Dr. C. P. Burger." Gads Forlag. Kobenhavn, 1920. See also *Geographical Journal*, vol. 58, p. 318.

maps for Lafreri, and Lafreri published in 1572 a reduced edition of Olaus Magnus' great map of the Scandinavian Peninsula, the *Carta marina.*

Marcus Jorden (1525 (?)–1595), a Holsteiner in Danish service and Professor at Copenhagen University 1550–53, was the author of a map of Denmark which had even greater influence. It first appeared in Braun and Hogenberg's *Civitates Orbis Terrarum* under the title of *Dania* and dated 1585. As regards East and North Jutland, Schleswig-Holstein, and Fyen, the map is superior to Anthoniszoon's; for the other Danish islands it was defective, and established a type which persisted, unfortunately, for 150 years. West and North Central Jutland, which Jorden had not explored, are poor, and the title *Cimbrica Chersonesus* was probably written across those regions to conceal ignorance. The Kattegat, Øresund, and the part of Halland shown are absurd; this may be because room was required in the Kattegat for two long inscriptions to Henrik Rantzau. Rantzau, the historian and Statholder of Schleswig and Holstein, was a friend and patron of Jorden's, and it was through him that Braun secured this map.

With alterations the map appeared in Ortelius' *Theatrum* of 1595, face to face with the familiar *Dania* of Anthoniszoon. Ortelius may have received the manuscript of it from his friend Hogenberg, since already in the 1592 *Theatrum* he had made an addition under Jorden in his *Catalogus Auctorum* "Idem Jutiæ peninsulæ tabulam conscripsit, cuius autographum apud me est." His edition, which he entitled "Cimbrica Chersonesus," shows only West Denmark, Scheswig and Holstein being omitted. He removed the inscriptions to Rantzau, inserted names and places in West Jutland where the title had been, and reduced the size of the map. For the Kattegat and its islands and the coast of Halland he substituted Anthoniszoon's far better version, but retained Jorden's configuration of the only islands shown—Fyen, Alsen, and Langeland. In this form Jorden's type of Denmark appeared in all the later editions of the *Theatrum.*

In the same year, 1595, Rumold Mercator published in his *Atlas* a map of Denmark which in many respects is a fairly close copy of Jorden's of 1585. The west coast of Jutland, Sjaelland, and Bornholm are altered and improved, and the title is removed from across Jutland; but, with a less prominent west Jutland coast, the type is the same. It was unwise of Mercator to copy Jorden's queer Langeland and his faulty Laaland and Falster; but as a result of his adoption of it the Jorden type of Denmark flourished for many years in the Mercator Atlases also. It was used with maps of Norway and Bureus' map of Sweden for *Scandinavia* until 1662, and even after Johannes Mejer's type of Jutland superseded it in the Blaeu Atlases of 1662 and onwards, the malconceived islands, especially Langeland, survived on many maps until 1750.

There is every probability that Mercator got a copy of Jorden's Denmark from Henrik Rantzau: the friendly relations existing between that patriotic nobleman and Gerard Mercator are described in R. Mercator's preface to the maps of Denmark in 1595. Whether the alterations noted above were made by the author or Mercator is uncertain. According to Ortelius and other writers,* Jorden made a map of all Denmark which was printed in 1552 by Joannes Vinitor (Hans Vingaard) at Copenhagen; in 1553–4, as a result of a partial tour of Denmark which he made by order of Christian III., Jorden drew a large map of Denmark, which he presented to Copenhagen University. Both of these are now lost. Jorden is known to have been busy with maps all

* E. Erslev, *op. cit.* H. F. Rørdam, 'Kjøbenhavns Universitets Historie fra 1537 til 1621.' Dl. 1, p. 637. Kiøbenhavn, 1868–9.

his life. If, as Erslev thinks, the map supplied to Rantzau for Braun was specially made for the occasion, Mercator's map, or even that of Ortelius, may represent one of these earlier maps or the author's revision of them.

In 1559 Joachim Louw of Hamburg published a map of Holstein by Jorden.* This was published by Ortelius in his *Additamentum* of 1579, and was included in all later editions of the *Theatrum*, with mention in the Catalogus Auctorum. Ortelius' rival, De Jode, however, had already published it, without acknowledgment, in his *Speculum Orbis Terrarum*, 1578. This shows a different Holstein from that on the 1585 map of Denmark. Mercator, who included Schleswig and Holstein on his map of Denmark 1595 and onwards, copied these provinces, but with alterations, from the 1585 map. His separate map of Holstein is quite different.

A quite new and remarkable map of all Scandinavia appeared in 1613. It is inscribed *Nativus Sueciæ adiacentiumque regnorum typus . . . Jodocus Hondius Junior . . . excudit* 1613, with a dedication to Gustavus Adolphus ending "hunc . . . Typum dat consecratque Adrianus Veno Aurelius." The natural identification of Adrian Veno with Adriaen Veen, who was just then famous for his "gebulte caerten" (maps drawn on rounded surfaces which represented sections of the globe), is not supported by any facts that I can find. The title and dedication point to Swedish influence, but further investigation is required.

At all events, the map, which also shows Finland, Livonia, and part of Russia, was the best representation of the Peninsula yet published. The Peninsula had fared badly in the hands of Mercator and Ortelius. The former made much use of both the charts and the map of Europe in Waghenaer's *Spieghel* (1585), and Ortelius, like De Jode, drew much for both the coasts and the interior upon Olaus' *Carta marina*; but neither achieved good results. Veno made more and better use of Waghenaer's map of Europe. His latitudes are almost identical, and he gave the Gulf of Finland the relatively correct west-to-east direction which none but Olaus Magnus, Waghenaer, and Kaerius (Caert Thresoor, 1598) had given it before. It must be remembered that Waghenaer himself had utilized Anthoniszoon's map. Veno's Baltic Sea and elongated Gulf of Bothnia are, however, copied straight from Mercator's map of Scandinavia. On the other hand, the whole of Denmark as well as Skåne on a new and improved map of Denmark by N. J. Visscher which appeared in the 1623 edition of the Hondius-Mercator *Atlas*, correspond at all points with Veno's version. It is also more than possible that G. Blaeu utilized Veno's map for his *Europæ recens descriptio* of 1617, which shows a Scandinavia very close to both Veno's and Waghenaer's. That the general excellence of Veno's map was recognized is shown by its inclusion, in a but slightly altered form, in several of the Mercator-Hondius atlases, though in none, curiously enough, until several years after its first publication. Re-engraved as *Tabula . . . Sueciæ et Norvegiæ* and without mention of any author, publisher, or date, it was published in the 1633 (French) and 1634 (Dutch) editions of Mercator and in Hexham's editions of Mercator (1636–38). All of these show less than the original in the east, *e.g.* the Gulf of Cheskoi is lacking and the title "Colgoyo Insula" moved westwards. As in the original, there are no names nor places marked on Bornholm.

The first scientific map of Sweden was that made in 1626 by Anders Bureus —or Andreas Buraeus van Boo—under the orders of Gustavus Adolphus, and

* Reproduced in Biørnbo and Petersen. 'Anecdota Cartographica Septentrionalia.'

published in six sheets at Stockholm in the same year. Visscher secured a copy which, much reduced and combined with a Norway resembling G. Blaeu's (1617) and Mercator's Denmark, was published under his name as a map of Scandinavia, in the 1633 (German, French *Appendix*) editions of Mercator. This became the standard map of Scandinavia, and under various titles and with acknowledgment of the authorship it appeared in most of the atlases of Blaeu, De Witt, Tavernier, and others. It did a great deal to perpetuate the Mercator-Jorden type of Denmark, including the Danish islands. Later cartographers took minor liberties with it, and put in latitudes to fancy.

Bureus' Sweden was the result of a scientific survey, and was done with Swedish thoroughness. The interior of no Scandinavian country had ever been mapped so completely in detail, and the map could be and was used by ordinary folk in the course of their business. Combined with the Denmark of either Mercator or Visscher and the Norway of Veno or Blaeu, it produced a Scandinavia which had some pretence to general accuracy. It presents, nevertheless, a very distorted Sweden. Although the relative distances are fairly correct, the width of the country below Fahlun was made far too great, and the configuration of the " shoe " of the Peninsula—Skåne and Småland—was less accurate than it was in either Anthoniszoon's or Waghenaer's maps. On the other hand, his representation of that *pons asinorum*, the Gulf of Bothnia, and the lands east and north of it was by far the best yet seen. His special maps were much better also than his general map. Of these three—*Upland*, *Götarike*, and *Livonia*—appeared in Blaeu's Atlas of 1641, and in *Götarike* Skåne and Småland had justice done to them. Six others—*Sweden*, *Svearike*, *Norrland*, *Lapland*, *Finland*, *Ingermanland*—were published in Blaeu's Atlas of 1662. These were the first maps of any of the Swedish provinces, though Olaus Magnus had shown some of them on his general map. This is the earliest edition that I have seen of Bureus' *Sweden ;* but it includes the greater part of Norway and Denmark, which presumably were not shown on the 1626 Stockholm edition, the *Rikskarta*.

Meanwhile Visscher's new map of Denmark already noted (1623) was taken up by various Dutch publishers, although the Blaeus retained Mercator's old version in their Atlases. This, like most old maps of Denmark, includes Skåne, and it marks the first appearance, on a map of Denmark, of a Skåne which was different from Anthoniszoon's type. Visscher's version of Skåne remained the standard until it was ousted by the type from Bureus' special map *Götarike*. Visscher improved Denmark still more on a map in his *Atlas Contractus* (*c.* 1650), in which Schleswig-Holstein was copied from Johannes Mejer's map of those provinces. Sanson published an edition of this in 1658, and it was issued by various Dutch publishers, sometimes in conjunction with Norway and Bureus' Sweden, between 1658 and 1664. The Blaeus probably had a nominal monopoly of Bureus' maps, for in 1649 they obtained formal permission from the Swedish Senate to publish them.*

A new type of Jutland appeared in most atlases and on many maps of Scandinavia after 1662. This was the type of Johannes Mejer, a Holsteiner who became Mathematician and Geographer Royal to the kings of Denmark. From 1648 onwards he was employed to survey all Denmark, and his maps are now, in manuscript, in the Royal Library at Copenhagen. They were never published in Denmark, and according to one account,† were only kept in the country by the patriotism of Peder Resen. Denmark was passing through

* Jacob Faggot, *op. cit.*

† ' Danske Samlinger,' vol. 2, p. 277.

troublous times, and Mejer received little financial help in his task. Being reduced to straits, he is said to have sold his maps of Denmark to Resen, who intended to use them in the *Atlas Danicus*. Later, after 1700, they were bought by the Danish king from another owner. If this be so, the Dutch publishers may have obtained their copies from Resen. In 1662 Mejer's Jutland was included in Blaeu's Atlas, cheek by jowl with the old Jorden-Mercator Danish islands; but it took some years to oust Visscher's type from other atlases and maps. His version of the islands—which, however, was very close to Visscher's—does not seem to have been known for a long time. Even when it was it left Fyen and Langeland untouched, and they persisted on some maps far into the eighteenth century.

Mejer's type of Denmark is the basis of the modern, accurate type. The correct and peculiar wave on the north coast of Jutland, which no map since those of Ptolemy had shown (and then out of place) was established, the Danish islands were reduced in size, and the Skagerrak and Kattegat expanded. The type underwent some unfortunate changes in the hands of seventeenth and eighteenth century cartographers.

Before 1648 Mejer had completed a set of thirty-seven maps of Schleswig and Holstein, which were published in Danckwerth's *Newe Landbeschreibung der zwei Herzogthümer Schleswig und Holstein* (1652). These are really good maps for their time, as good and on a larger scale than Bureus' Swedish ones. Schleswig and Holstein were included in Blaeu's Atlas of 1662 and later editions. There they superseded a good *Holsatiæ Nova Tabula*, which was printed by H. Hondius, but was probably of German origin. This had superseded Mercator's *Holsatiæ Ducatus* in 1633. Mejer's maps of Iceland and Norway, which have never been published, are not, apparently, of any great value.*

A special map of part of Norway—which, cartographically, had been the Cinderella of Scandinavia—was published in Blaeu's Atlas of 1641. This was *Stavanger*, by L. Scavenius. From 1664 onwards many new maps of provinces began to appear, and the general maps of Norway and of Scandinavia showed corresponding improvements. Finally, in his maps of Norway and of Scandinavia (1781–5) C. J. Pontoppidan produced a work which did justice to the northern kingdoms. G. de Lisle's *Carte des Couronnes du Nord* (1788), of which the first edition appeared in 1708, was different from Pontoppidan's Scandinavia but a fit partner for it.

The history of northern cartography emphasizes again the fact that sea maps must precede land maps. Compared with later maps, the charts of Anthoniszoon and Waghenaer were extraordinary for their general accuracy. In consequence of trading and whaling expeditions and of the search for a North-East passage, the northern waters of Norway and Finland were charted by the Dutch comparatively early; the "East Sea" was long in becoming accurately known. Johan Månsson's *Siö-Book* of 1644 seems to have had little influence, but if the Danish Government had permitted the publication of Jens Sørensen's numerous and valuable charts (1695–1723), the peoples of Scandinavia need not have had so many of their maps made by foreigners, nor made so inaccurately.

EDWARD LYNAM.

* P. Lauridsen, 'Kartografen Johannes Mejer.' (Historisk Tidsskrift, R. 6, Bd. 1, Hfte. 2.) Kjøbenhavn, 1888.

CENTRAL EUROPE

Landerkunde von Mitteleuropa bearbeitet von **Prof. Dr. Fritz Machatschek.** (Enzyklopädie der Erdkunde.) Leipzig: Franz Deuticke. 1925. $10\frac{1}{4} \times 7$, pp. x. + 430. *Sketch-maps. G.M.*20.

THIS is an important book, but one that may seem rather forbidding on first inspection. However, it is a volume of an "Encyclopædia of Geography," and its individuality has to be discovered by careful reading. It is a work for the serious student; and to get *full* value from it he must surround himself with atlases, have at his elbow the topographic maps of several cartographic institutes, and, if possible, have access to a good collection of photographs. In short, this new 'Mitteleuropa' should be read within the precincts of a well-equipped geographical department. These departments should acquire the book at once, for it covers much ground not easy of access otherwise; and it is also an excellent index to published sources, a "select" list of these running to no fewer than 1032 items. But a less systematic reader need not be discouraged. He will derive benefit and even enjoyment from quite casual perusal of any section that interests him. For the style is nearly always fairly easy to an English reader, and many of the descriptions, whether of land forms, vegetation, or human responses, could not be improved.

The author is to be congratulated on producing a very well-balanced regional account of Central Europe. The Introduction tells us that less complete treatment has been given to parts that have formed the subject of recent works; but this is not a noticeable feature. He has contrived to get a vast amount of matter into comparatively small space, first by economy of words—it is difficult to find a superfluous word in the whole 370 pages—and secondly by assuming considerable previous knowledge on the part of his readers.

One inevitably compares this book with the volume by Partsch; and we find at once a difference in the extent of the territory discussed in the two works. Partsch adhered to political limits and included with the two central Empires, the Netherlands, Belgium, Switzerland, Bosnia, Montenegro, Serbia, Bulgaria, and Rumania. Machatschek partly follows natural boundaries. Thus he takes the Save and Lower Danube as the south-eastern limit. He includes all the Franco–Swiss Jura on the west, most of Poland on the east, and all of Denmark. But for the convenience of the Encyclopædia the Netherlands and Belgium are omitted.

A map (Plate I.) divides Central Europe into thirteen major natural regions as follow: The Alps; Alpine foreland; Jura; South-western Germany; Central Germany; Northern plain (German, Danish, Polish); Sudetes region; Polish uplands; Carpathian foreland; Carpathians; Danubian plains; Hungarian "Mittelgebirge"; Wallachian basin. These, or their subdivisions, form the subjects of chapters or sub-chapters. The same map shows (in red) the limits of fifteen climatic provinces, which diverge widely from the natural regions, especially in the north. This climatic division shown on the map does not seem to be adequately treated in the text. For there is no clear account of the basis upon which the division into "provinces" rests either in the general introduction to climate or in the sections devoted to the climate of the natural regions.

The word "forbidding" has been used above. It was applied in view of the compressed nature of the text, demanding very careful reading, and also on account of the paucity of illustrations. These are nearly all maps. A few—very clear ones—are from Hettner's "Länderkunde"; several are ex-

tracts from the topographic maps—German and Swiss (1 : 100,000) and Austrian (1 : 75,000). There are also seven folding maps; but they do not fold out so as to be wholly in view when the text is read. This fault is mentioned because these maps are quite essential. For instance, most students of geography will find the sections on the geological structure—*e.g.* of the Alps—quite difficult to follow, and without the map before the eyes almost unintelligible. However, such maps as are provided are well drawn and reproduced.

The book is divided into a short general and a long special (*i.e.* regional) part. Under the first we find a brief geological history; an account of the climate as a whole, with a very useful summary of the resulting river regimen; an interesting statement on the evolution of the vegetation and its present distribution; a valuable anthropogeographical summary, treating such subjects as races and settlements from prehistoric times, village types, town types, and the determining factors in each case; finally a compact account of the origin and present economic condition of each sovereign State, including the more essential statistics.

In tackling the main part of the book, the author has aimed—as he says in his preface—at writing scientifically constructed explanatory descriptions of the natural regions. He deliberately chose this method, at the risk of being thought old fashioned, in the belief that such a method is more suitable in an encyclopædia than other methods perhaps more attractive to read. And, as already indicated, he has succeeded in keeping his regional portraits harmonious throughout, balanced in their composition, pleasing if not striking in their colour, and neither pre-Raphaelite nor post-impressionist in their technique.

The major regions receive the same general treatment in each case, varied in detail to suit the special region under discussion. The geological aspects as set forth may appear to many as rather heavy food in such concentrated form. Not so the climatic descriptions, especially as the physical facts are well integrated with biological effects. Vegetation is described in all sections, sometimes briefly but always well. Much attention is given to the geography of settlement, beginning with archæological evidence and passing to historical data as leading up to the present distribution of the people and the nature of their occupations.

In dealing thereafter with the sub-regions the writer has included a greater wealth of topographic detail, and the earlier generalizations are amplified.

Professor Machatschek has succeeded in his aim, for he has brought out the individuality of the regions; and he leaves the reader feeling that the most salient characteristics of Central Europe as a whole are its great variety and its vivid contrasts.

But the English reader must not grumble if the author makes him go and rub up elsewhere his previous knowledge—say of early European history.

A. G. O.

REVIEWS

EUROPE

The Historical Geography of Early Ireland.— Walter Fitzgerald. [*The Geographical Teacher*. Supplement No. 1.] London: G. Philip & Son. [1926.] $6\frac{1}{8} \times 9\frac{5}{8}$, pp. vii. + 94. *Three Illustrations and Twenty-five Maps.* 5*s. net* (to members, 4*s.*).

THIS work is a praiseworthy attempt to correlate the geographical, archæological, and historical facts about Ireland. To succeed completely in such a

task the author would have had to write a much larger book; he has succeeded in writing a suggestive introduction to an important and neglected subject.

Mr. Fitzgerald has dealt ably and clearly with the geography of Ireland, although his descriptions are not sufficiently illustrated by maps. On Irish archæology he follows not only such sound authorities as Coffey and Professor Macalister, but older and less scientific ones like Sir W. Wilde and W. K. Sullivan, and is therefore prone to draw conclusions which no archæologist would venture to draw for a country so little investigated as Ireland is. His remarks, for example, on the distribution of broad-heads are not reliable; on the other hand, the survey of Ireland during the Copper Age is very well done.

The author has weakened the authority of some of his statements on both history and archæology by quoting the old Irish annals in support of them. Our annals before 100 B.C. provide a ready text to support almost any theory. They were written down—and edited—in Christian times, and the useful information about the Neolithic and Bronze periods which Mr. Fitzgerald extracts from them probably refers to the Iron Age at the earliest. The author does not seem to be familiar with Professor Eoin MacNeill's work on early Irish history. The fanciful interpretations given by the annalists for such tribal names as *Lagin* and *Gaileoin* do nothing but mislead: and surely the Irish were not known to the Romans as *Scotæ*?

The numerous archæological and historical maps are not of equal value. For instance, there is no evidence, as far as is known to the reviewer, either that the Irish colonized all Cornwall and all Brittany in the early centuries of our era (see Fig. 23), or that most of the wine which reached Britain before the Norman Conquest was probably re-shipped from Irish ports.

When the author gets away from the geography of Ireland or when he writes of his Greater Ireland—the epithet is ours—of the fourth to the eighth century, enthusiasm and facile historians are apt to lead him too far. For all that, the book is too big both in conception and performance not to be useful in many ways. With this volume a promising beginning has been made to the series of Supplements to the *Geographical Teacher*. E. L.

A Romantic in Spain. (Un voyage en Espagne.)— Théophile Gautier. Translated from the French by **Catherine Alison Phillips.** London: A. A. Knopf. 1926. $7\frac{1}{2} \times 6$, pp. xvi. + 324. *Illustrations.* 10*s.* 6*d. net.*

The President's Hat.— Robert Herring. With drawings by Hubert Williams. London: Longmans, Green & Co., Ltd. 1926. $8 \times 5\frac{3}{4}$, pp. 220. 10*s.* 6*d. net.*

A Wayfarer in Spain.— Alice M. S. Newbigin. London: Methuen & Co., Ltd. [1926.] $7\frac{1}{2} \times 5$, pp. 207. *Illustrations.* 7*s.* 6*d. net.*

'A Romantic in Spain' is an English translation, usually sound and always unobtrusive, of 'Tra los Montes,' the earlier of the books into which Théophile Gautier gathered together his descriptive articles on Spain. Unfortunately, it is disfigured by specimens of the gross carelessness of the proof-reader; even a "semi-classic" surely deserves an edition which does not contain: a line hopelessly out of place (p. 84), "Guadalquivir" for "Guadalaviar" (twice on p. 321), and the flagrant misspellings in the titles of chapter xii. and of the frontispiece.

Whether anything is really gained by the change of title in this English edition is most doubtful. For Gautier, while technically a Romantic, as the word is understood with reference to the France of his time, has qualities which the modern reader does not associate with this term. A romantic in the most popular sense when he wrote of " the lofty summits " that they " glittered and sparkled . . . like a dancer's skirts beneath a shower of spangled silver," he was also a romantic in the technical sense when he created those word-paintings which are permanent contributions to the description of Spanish scenery. But he was at the same time a competent and vigorous art critic whose judgments were backed by a great store of knowledge. And he wrote of the clothes, food, and customs of the people, and of their houses and furniture, with a careful attention to detail which no Realist could have surpassed ; with a little more time and a scholarship, he could have left behind him, in fact, a record of the Spain of 1840 of permanent value to the folk-lorist of the Van Gennep school ; as it was, he went some way towards doing this. Moreover he was at bottom a pessimist, in spite of the whole-hearted gaiety with which he plunged into the life around him ; beneath the surface of the present he saw only " a most disheartening uniformity invading the universe under some vague pretext of progress," and of the future he had no vision beyond " an immense tedium " when " curiosity, the chief incentive to life, will be extinct." Spain attracted Gautier because it had resisted more stoutly than other countries the processes tending towards uniformity.

For the same reason the Andorran Pyrenees attract Mr. Robert Herring, the author of the second of the books recorded above, although his book is less about the Pyrenees than about life itself *à propos* of the Pyrenees.

Mr. Herring has something of Gautier's outlook ; he says very often the same things as Gautier—in praise of water, for example, in praise of the road, in dispraise of civilization—and he says them freshly and, occasionally at least, as well.

But while Gautier wrote with the rapidity of the journalist and with complete freedom from self-consciousness, throwing his descriptions on to a large canvas, Mr. Herring gives the impression of a worker in miniature : his canvas is tiny ; he consciously selects, and consciously avoids, words ; he is tiresomely introspective. Nevertheless he is fundamentally less pessimistic ; harbouring no illusions about the past, he accepts travel consciously as a merely temporary reaction from the life of cities, which it yet permanently enriches, since " life is more, perhaps, of the Pyrenees (in London) than when you are actually here," only " more vivid, because, of course, it comes from inside, not out."

There are passages, too, in his book which, for delicacy of perception, are not surpassed in Gautier ; no one should miss reading the descriptions of the balcony at Soldeu and of the square at Old Andorra by moonlight, just as no one should be deterred from beginning this book at all by its unfortunate introduction.

And Mr. Herring has a rarer quality of appreciation—the appreciation of " the real grandeur which common things may have when perfectly expressive of their function," and of " that functional beauty which alone is beauty." These are great words which every traveller might well ponder. For Mr. Herring they open up a passage from his subjective to his objective world ; may we suggest to him that this passage might with great advantage be considerably widened ? At present Nemesis often overtakes him when he condescends to the objective : Andorra is not, for example, a Republic ; it has no President, and therefore no President's hat ; it has neither economic autonomy

nor simplicity of political structure, and it is not a very good example of the survival of the mediæval economic system.

From these two books of true wayfaring we turn to Miss Newbigin's book with keen anticipation aroused by the title 'A Wayfarer in Spain.' Blank dismay fills us when we find what must surely be one of the primmest accounts ever written of places on or near the beaten track. Sometimes a picture seems on the point of forming—the author has an eye for flower and shrub and tree—but just as we begin to be interested, it degenerates into a catalogue, or, worse still, a reminiscence.

"Memories of 'Treasure Island,' 'Robinson Crusoe,' 'The Blue Lagoon' seemed floating in the air," for example, on the coast near Denia. Surely this is profanity! What *does* the word "Wayfarer" mean to Miss Newbigin and her publishers? R. A.

Cities of Sicily.— Edward Hutton. London: Methuen. 1926. $8\frac{1}{2} \times 5\frac{1}{4}$, pp. 244. *Illustrations.* 10*s.* 6*d. net.*

This is another of the many books on districts of Italy which Mr. Hutton has written. It might be described as an account of a tour round the island during which special interest was taken in Messina, Etna, Syracuse, Girgenti, Selinunti, Segesta, and Palermo. Any one visiting these places will find Mr. Hutton's book very useful in directing his attention to the most interesting features of scenery and remains of ancient art and architecture, and pointing out how they can most easily be seen. In this it serves the purpose of a guide-book; but it is a good deal more than that. The author, well versed in classical literature and history, lives again in the past among the ruins and relics of the Greek, Carthaginian, Saracenic, and Norman occupation of the island. He has a happy way of introducing, without pedantry, literary and historical references from Homer, Theocritus, Thucydides, Diodorus, and others, to illustrate what he observes and describes. In fact, the term "pilgrim" books which has been applied to his works seems a very appropriate one.

The artistic remains of Sicily recall the recurring struggles that have taken place on the island, the cockpit of the Mediterranean, between Phœnicians and Greeks, Rome and Carthage, Saracen and Christian. The whole island came under Saracenic domination by 965, a domination which benefited it by establishing an admirable system of administration and taxation which was inherited by their Norman conquerors. An interesting account is given of the conquest by the Normans, and their residence in the island during the eleventh and twelfth centuries. But the Normans in their turn succumbed to Aragon. "Thus upon the amazing palimpsest of Sikelian, Phœnician, Greek, Carthage, Rome, Byzantine, Saracen, and Norman, the cold indifferent arrogance of Spain is imposed at last—to endure—to endure in a sort of death until Garibaldi awakened the island from its frozen silence with the shouts of his Thousand—*Viva Italia.*"

The author's enthusiasm for Greek Art is sustained, as well it may be, by the contemplation of its remains in Sicily from the earliest period down to Byzantine times. After briefly describing the contents of the Museo Nazionale at Syracuse, he remarks how admirable it is to see with what great works of art the Greeks in Sicily were continually surrounded even in the ordinary ways of life, and how humiliating it is to realize that no one alive to-day could make such things, or even conceive such beauty. And when we come down to the twelfth century we see its last expression in Byzantine art. Nothing more glorious remains in all Sicily than the magnificent Byzantine work like that

manifested in the marvellous mosaics adorning the great church at Cefalu founded by Roger in 1131. Here we see Greek art, the Greek genius, manifesting itself for the last time in a sunset of colour, of gold and precious stones, harmonious and lovely, and with its wonted genius for decoration.

But the reader is not called on merely to concentrate his attention on the past. Mr. Hutton waxes eloquent on the natural beauties of the island, whether it be the distant view of Etna, the grandeur of the north coast, or the lovely gardens of Palermo. The imaginative reader with Mr. Hutton's book in his hand will be able to spend a pleasant hour in calling up the past history and present condition of what is perhaps the most interesting island in the world.

The book is illustrated with twelve coloured plates by H. Morley, fourteen photographs, and a map. E. A. P.

Les Alpes; Géographie Générale.— Emm. de Martonne. (Collection Armand Colin, No. 76.) Paris: A. Colin. 1926. 6¾ × 4¼, 217 pp. 12 *Maps and* 12 *Figures.* 9 *fr.* 80.

The present volume is exactly what its title implies—a Geography of the Alps. It is written in a very easy, fluent style, and is to be recommended to all who are at all interested in this great European mountain chain. The general reader will find in it much of great interest. It is no disparagement to say that it ought to be used in company with a 'Blue Guide' or a 'Baedeker.' Scenery, Types of Human Life, History, and Industry are all discussed in a way that any reader will appreciate. Many who visit the Alps are greatly interested in some aspect of the scenery, in the railways, in some industry or other matter, and it is not always easy for them to obtain information on such points. This little volume will, however, explain many things to the tourist, and, what is more, will probably give him a much greater interest in what he sees than he would feel without such help. The professional geographer will also read the book with advantage. To compress into 200 small pages a general account of Alpine geography is no small feat, and Professor de Martonne has accomplished it with marked success. Practically all important aspects of the Alps are considered, and in a way at once scientific and stimulating. It fulfils most satisfactorily the main objects of this library, which are, in brief, similar to those of our "Home University" series. We cannot do better than to give a short synopsis of its contents.

The earlier chapters deal with the structure and scenery of the Alps. Details are necessarily omitted, but the reader is introduced to the nature of the great mountain-building movements which have been so well studied by Swiss geologists. The main results of glaciation and rejuvenation are also carefully explained. Climate and altitude are treated together, and their effects on the national life demonstrated. The Föhn wind is clearly described, together with its beneficial effects.

The chapters dealing with the human side of geography are admirable. An account of the early history of this region is followed by one of the movements of the population in historic times. Then, after describing the main types of habitation, the author gives a clear picture of the agricultural and industrial activities of the Alps, emphasizing, amongst other matters, the seasonal migrations (*transhumance*) and the great importance of water-power. The final chapter is devoted to transport by road and rail.

Each chapter is followed by a short but valuable bibliography, and there is a useful summary chapter at the end. The maps are helpful, but some of the illustrations are not very clear. There is no index, but the analyses of the chapters make up for this to some extent.

The cheapness and portability of the book enhance its intrinsic value and make it a capital companion on a visit to the most accessible mountain chain in the world. J. A. S.

Die Oberflächengestaltung des Nordostestländischen Küstentafellandes.— A. Tammekann. (Publicationes Instituti Universitatis Dorpatensis Geographici, No. 12–14.) Tartu. 1926.

As an example of modern geographical method, the plan adopted by this author in carrying out a personal investigation of a small area, and following it up with a descriptive presentation of the same, is, from the scientific point of view, ideal. Taking a small portion of the Estonian coastal plateau as his theme, Mr. Tammekann deals, in section I., with the orographical conformation, ranging each feature descriptively in a category of its own. Having thus created in the mind of the reader a series of form-types, he arranges these in form-groups, describing finally their distribution throughout the region.

Section II. deals with the underlying geological structure of the region: first the solid geology, which includes evenly stratified beds of Cambro-Silurian age; then the much later Quaternary deposits which, irregularly strewn over the surface of the ancient rocks, impress their distinctive character upon the scenery.

Section III.: "Physiology of the surface-modelling," enumerates (under A) and defines (under B) the part played by the various agents of denudation and deposition now at work: the effect, namely, of climate and land-and-water distribution on that particular corner of the Baltic Basin, combined with their more local expression in the form of temperature-variations, wind, rain, running water and the sea, as influenced also by the mantle of vegetation and the intervention of animals and man.

Section IV. treats of the origin and development of the surface conformation, as subjected (1) to pre-glacial; (2) to glacial influences; (3) to the alternations of level which supervened in late-glacial and post-glacial times; and (4) to the detailed results of these.

If criticism of such admirable work is permissible, it might be suggested that by rearrangement of the component parts greater terseness might be attained. Also that the writer, while making use of much recent work, omits that of Philip, which goes far to explain the relationship of the various portions of end-moraine. E. G. W.

ASIA

Campaigns in Palestine from Alexander the Great.— Israel Abrahams, M.A., Lit.D., D.D. The Schweich Lectures for 1922. Published for the British Academy, Oxford University Press. 1926. 10 × 6, pp. x. + 56. *Map and Plate of Coins.* *5s. net.*

These three lectures by the late Dr. Israel Abrahams were delivered before the British Academy in London in 1922, but unfortunately the lecturer had not completed their revision at the time of his death, 6 October 1925. Dr. Stanley Cook, who writes an interesting and appreciative preface, has seen the manuscript through the press. The result is a finished work of great interest and charm. Dr. Abrahams points out that the battles of Palestine have been unique. "No area of the Earth's surface has so often re-echoed to the tramp of armed men," especially along its coastal regions. "The campaigns in Palestine are among the most decisive of history."

Beginning with Alexander the Great, the writer states that, regarded as the turning-point in the relations of the East and West, his campaign along

the Palestinian Coast, his seven months' siege of Tyre, and his two months' siege of Gaza, must be placed first for importance among the decisive moments in all history. The Maccabean campaigns—of a period which Dr. Abrahams made peculiarly his own—occupy the second lecture, and the whole of the masterly victories of Judas Maccabæus—in Galilee, on the rough Bethhoron pass, at Emmaus, and at Beth Zacharias—are described most graphically, and the secrets of his success analysed. The third lecture begins with the Jewish contests with Rome. It is the writer's opinion that at the Siege of Jerusalem, "had there been union within the walls Titus, even with the aid of famine, could not have taken the city without heavy reinforcements, and Rome could not have supplied them." There is much that is new and interesting about Bar Cochebar's campaign, A.D. 114–117, and also about the Crusades, especially the 3rd Crusade, when "the duel was fought by rivals worthy of each other"—"Richard of the Lion-Heart and Saladin Defender of the Faith." In conclusion, it should be added that the author has treated his subject with great breadth of view and has illustrated it with a wealth of Biblical and antiquarian references. E. W. G. M.

An Asian Arcady: The Land and Peoples of Northern Siam.— **Reginald le May.** Cambridge: W. Heffer & Sons, Ltd. 1926. 10 × 6½, pp. xiv. + 274. *Numerous Illustrations and a Map.* 21*s. net.*

This book, the author states, is designed as a companion volume to P. A. Thompson's 'Lotus Land,' which described the country, customs, and characteristics of Southern Siam. It is also in some respects complementary to W. A. R. Wood's recently published 'History of Siam,' which was reviewed in the *Journal* of May 1927. Mr. le May has had many years' experience of Siam, first in the Consular Service and later as acting Adviser to the Siamese Government in the Ministry of Commerce and Communications, and so is well qualified for his task, and, in addition, he has an obvious affection for the country and sympathy with the likeable and simple-hearted Lao who inhabit Northern Siam.

He begins by giving an historical survey, necessarily compressed, of Northern Siam from the earliest times to the present day, and then proceeds to a topographical and ethnological description of the country. Nothing indicates the changes which have come over Siam in recent times more clearly than the fact that, whereas even twenty years ago the journey from Bangkok to Chiengmai, the northern capital, might take anything up to three months by boat, it may now be accomplished by train in just over twenty-four hours.

The last, and longest, section of the book is devoted to travel and personal experiences. Mr. le May takes his reader on a long trek through the heart of Lao land, a distance of some 600 miles, and at the end of each stage of the journey he varies the possible tedium of travel by allowing a story-teller to relate some of the old Lao legends and fairy tales from the store at his command. The book is excellently illustrated, has two useful maps, one in colour, a bibliography and a good index; and altogether is a valuable and painstaking piece of work which is a welcome addition to the none too extensive literature on Siam. O. R.

Handbook to British Malaya, 1926.— Compiled by **Captain R. L. German,** Malayan Civil Service. London: Malay States Information Agency. 8½ × 7, pp. 183. *Numerous Illustrations and a Map.* 2*s.* 6*d. net.*

The Malay States Information Agency is doing excellent work in making the public more familiar with the resources, products, and possibilities of British

Malaya, and this handbook is a model of what such work should be, for it presents an authoritative, comprehensive, and lucidly written account of the Straits Settlements and all that part of the Malay Peninsula which is under British influence. It does not include any details of the British possessions in Borneo, or of the Cocos and Christmas Islands. After a short description of the country and its inhabitants, and a historical survey, it deals with administration, agriculture, finance, mining, communications, trade, sea fisheries, big game, and native industries, so that any one in search of accurate information about this flourishing part of the Empire will find it here. The illustrations are good and well selected, there is a good index, and, above all, an excellent map in colour.

The Long Old Road in China.— Langdon Warner. New York: Doubleday, Page, & Co. 1926. 10 × 7, pp. viii. + 168. 24 *Illustrations and* 3 *Maps.* $5 *net.*

It is not often that a reviewer can endorse the claims made on the "jacket" by the publisher of a book of travel, but here is a book which indeed has something of the quality and scope of the great classics of adventurous exploration. Mr. Langdon Warner is a Fellow of the Fogg Art Museum of Harvard University for Research in Asia, and the object of the journey he describes was to make a thorough reconnaissance of Edzina or Kharakjato, the Black City of Marco Polo, and to discover and bring back some of the Buddhist frescoes and statuary from the Caves of the Thousand Buddhas at Tun Huang. Although Sir Aurel Stein, Colonel Kozlov, and Professor Pelliot had been before him, he found much good work left for him to do, and was able to take back archæological treasures the like of which America had never seen. Those are the bald facts, but the narrative in which Mr. Warner relates them is one of curious and compelling charm. He tells us just enough of the everyday incidents for us to visualize the delights, the difficulties, and the rigour of that great journey along the immemorial North-West road across China from Peking; at times his prose rises to great heights of descriptive power, and throughout the book the reader is made to feel the fascination of the quest. O. R.

AFRICA

The Physiography of Southern Nigeria and its Effect on the Forest Flora of the Country.— J. R. Ainslie, B.Sc. (Oxon.), Senior Conservator of Forests, Nigeria. (Oxford Forestry Memoirs, No. 5.) Oxford: Clarendon Press. 1926. 11 × 7½, pp. 36. *Sketch-maps and Illustrations.*

The physical features of Southern Nigeria are not very pronounced, but they exercise a marked effect on the vegetation. The country is a vast plain sloping up from the seaboard inland to an average height of 1200 feet, with mountain ranges on the east up to 6000 feet. With the exception of the Cross River in the east of the country, which almost describes a circle, the rivers all follow the general inclination of the land and flow from north to south. Those of the east and west are separated by watersheds from the Niger system which occupies the middle of the country.

Three physiographical regions are recognized. The Littoral Region, composed of mud, sandbanks, and swamps, embraces the lagoons and deltas, and may reach a depth of 40 miles from the sea. It is covered chiefly with mangrove or scrub and secondary forest following on after cultivation. Behind this is the Plains Region, to a depth of 170 miles, gradually rising to an elevation of 500 feet. It is covered generally by closed forest. Farther inland again, in the north and east of the country, are four areas described as The Uplands,

covered partly by closed forest and partly by savannah forest. They are the Yorubaland Uplands in the west, the Udi Plateau to the east of the Niger, the Oban Hills, and the Sonkwala Plateau on the east boundary adjoining the mountains of the Cameroons.

The principal factor which determines the chief types of vegetation is the moisture-laden south-west monsoon, which blows across the Gulf of Guinea. In the east the seaboard lies directly across the path of this monsoon, and the country is heavily forested; in the west the seaboard trends away from the point of incidence of the monsoon, and the country is only partially forested. The farther the distance inland from the north-west to south-east seaboard the weaker becomes the influence of the monsoon, and the vegetation passes from tropical rain forest where the annual rainfall exceeds 70 inches, through tropical deciduous forest with annual rainfall 70 to 50 inches, to savannah forests with rainfall less than 50 inches.

Broadly speaking, these three climatic types of vegetation correspond to the three physiographical regions, although there are many areas where exceptions occur.

Swamps and rivers exercise an edaphic influence on the vegetation and give rise to mangrove forest along the littoral, to fresh-water swamp vegetation inland, and still farther inland to fringing forest, all of which may be considered as being due to the configuration of the country.

There is therefore a double series of vegetation types stretching from the coast to the northern boundary; the climatic series of sandbank scrub, rain forest, and deciduous and savannah forest; the edaphic series of mangrove, fresh-water swamp, and fringing forest; each corresponding to the three physiographical regions, the littoral, the plains, and the uplands.

Detailed notes on the general geology and soils of the country are given, together with descriptions of the forest types and their floristic composition.

T. F. C.

The Geology of South Africa.— Alex. L. Du Toit. London and Edinburgh: Oliver & Boyd. 1926. 9 × 6, pp. xi. + 463. 39 *Plates*, 64 *Text-Figures, Geological Map.*

Readers of Dr. Du Toit's stimulating address to the South African Association for the Advancement of Science in 1924 may well feel that he was the man to write a Geology of South Africa, combining as he does a wide and detailed knowledge of the facts with considerable ability in grasping their inter-relationships and drawing generalizations. This book will not disappoint them.

South Africa is one of those continental masses that have been above sea-level for such long ages, suffering such prolonged denudation, that the greater part of the surface reveals rock-structures formed at great depths in very ancient times. Thus three-eighths of this work deals with pre-Devonian (mainly, if not entirely, pre-Cambrian) rocks, of which there is system after system, including the famous banket and the wonderful Bushveld igneous complex. In the extreme south, marine Devonian sediments have been folded up and incorporated in the continental mass. At a slightly later geological date came a great glacial episode, followed by the deposition of the thick Karroo system of inland deposits, famous for its wonderful succession of reptilian faunas. In later times the continental margin dipped gently under the sea on several occasions—twice at least during the Cretaceous period, once in the Eocene, and once at least later, though not the same area was submerged in each period. Finally, considerable inland deposits—desert and

fluviatile—have been laid down in late geological time. All these deposits are fully described, and the up-to-date character of the book is shown by the incorporation of J. Böhm's recognition of the Lüderitz Tertiaries as Eocene instead of Miocene.

Economic geology naturally receives much attention, but there are also broad academic problems posed by South Africa. How shall we explain the identity in both Devonian and Karroo in South Africa and the Falkland Islands? Dr. Du Toit evidently inclines to the mobilist explanation of Wegener. How comes it that the glacial striations below the Dwyka conglomerate indicate ice-flow from north to south? Must we imagine that South Africa has drifted from beyond the South Pole? These are but one or two of the questions raised by South African geology. In whatever branch of the subject the reader may be interested he will find full and clear information in Dr. Du Toit's book, which is admirably illustrated. A. M. D.

The Stone Age in Rhodesia.— Neville Jones. London: Oxford University Press. 1926. 9½ × 6, pp. 120. *Frontispiece and* 40 *Illustrations; Sketch-map as end-paper.* 12*s.* 6*d. net.*

The aim of this book, by the Rhodesian Correspondent of the Royal Anthropological Institute, is to write such simple account of the Stone Age in Rhodesia as may stimulate general interest in the subject. How far it is possible to give a simple and yet accurate account of such a subject may be questioned, but the book undoubtedly succeeds in arousing interest. The area dealt with is confined, so far as is possible, to the colony of South Rhodesia, and though no human remains have yet been discovered in any of the implement-bearing deposits there, and the finding of the skull (*Homo Rhodesiensis*) at Broken Hill has diverted attention to Northern Rhodesia, the South in many ways presents an unrivalled field for research.

The author prefaces the account of his own investigations by an elementary introduction and study of what he terms the "scientific background," entering the real subject with a tentative classification of South African cultures, and an analysis of the salient characteristics of these. On the basis of his own observations, he divides the South African Lower Palæolithic cultures into three main divisions, corresponding in cultural details with equivalent European cultures, and indicates their Rhodesian representatives. Chapter v. describes in some detail a few of the most typical modes of occurrence of the earlier palæolithic remains, with photographic illustrations. With so much more important matter to be dealt with, the digression as to the geological history of the Zambezi gravels seems out of place. It does not, at least for the reviewer, really "assist in visualizing" the Zambezi Falls. (The reference does, however, allow the introduction of an interesting appendix, pp. 114–116, giving notes by Dr. Hrdlička as to his observations there in August 1925.) Of much greater interest and significance is the description of the implements taken by the author from the Zambezi soils and the Umguza valley, where implements of a newer culture occur in association with those of the older Palæolithic. The Umguza and other rivers of the high veld are particularly rich in implements of the older type, pointing to an extensive population in Palæolithic times.

The later chapters of the book deal with more general and familiar matters, especially the Bushmen in Rhodesia, and their cave paintings and highly specialized implements. There are also accounts of a visit to the Bambata cave, and an analysis of the three "solutions" generally offered as to the *raison d'être* of the Bushmen paintings.

In his concluding paragraph the author laments that he has said so little. He has, however, succeeded in saying it in such a way that one is left wishing he had said more. B. H.

The Autobiography of Kingsley Fairbridge.— Preface by **L. S. Amery**; Epilogue by **Sir Arthur Lawley.** Oxford University Press; London: Humphrey Milford. 1927. Pp. xii. + 188. *Portrait and Map.* *6s. net.*

Kingsley Fairbridge's autobiography makes an appeal to the reader independent of "local colour," though that colour be amazingly vivid. It is a revelation of the inner life as well as of the deeds of a youth who had seen a vision and who lived just long enough to begin to translate his vision into reality. The vision was the peopling of waste places by white people from England, and it came to Fairbridge, when a lad of some twelve years, on the open veld in Eastern Rhodesia.

Fairbridge, at the age of eleven and in the year 1896, was taken to Manicaland. Born at Grahamstown, he had already learned something of the life on a farm and of the creatures of the wild, and was a fair shot; in Rhodesia he was almost at once called upon to play a man's part—exactly why is not clear, but at fifteen he is making decisions without consulting his parents and going off on a trip to the Zambezi. His account of his life in Rhodesia, apart from its disclosure of the mind of a very remarkable youth, is a fascinating picture of the early pioneering days, and includes some wonderful big game adventures. It gives, too, more than one footnote to the story of the making of Rhodesia as told recently by Mr. Marshall Hole.

In 1908 Fairbridge, who in 1903 had spent a holiday in England, which he at once loved, came again, still full of his vision. Having at the fourth attempt passed the necessary examination—he started his studies entirely ignorant of Greek and Latin—he was entered at Exeter College, Oxford, as a Rhodes Scholar. At Oxford he founded—in 1909 while still an undergraduate—a Child Emigration Society. Its object was to take orphan and destitute children from England to Rhodesia, and there train them for farm work. But the Chartered Company needed (or so it thought) men, not child, settlers. In the end the scheme was put into operation in Western Australia, and to-day the Fairbridge Farm School in that State is an established institution, fulfilling well its founder's purpose. The autobiography ends, however, with the memorable night at Oxford when the Child Emigration Society was founded; it was left, Mr. Amery tells us in the preface, in a somewhat ragged form, and has been arranged and edited by Miss V. F. Boyson with loving care and obvious judgment. The rest is outlined in an epilogue by Sir Arthur Lawley. Two or three facts, which Sir Arthur omits, may help to round off the story. At Oxford Fairbridge, who specialized in forestry, obtained his diploma in 1911; in the same year he married Miss Ruby Whitmore. He had already published (in 1910) his 'Veld Verse,' quotations from which head some of the chapters of the autobiography. In 1912 he started his first farm school; in July 1924 he died. He will have two permanent memorials: his Farm School and this book. F. R. C.

AMERICA

Vom Wirtschaftsgeist in America.— **Alfred Rühl,** Professor in the University of Berlin. Leipzig: Quelle & Meyer. 1927 [1926]. 8½ × 5, pp. x. + 152. *RM.* 5.40.

This booklet is another of the author's 'Studien über den Wirtschaftsgeist der Völker,' one of which was noticed in the April number, p. 363. Generally

it may be said that this study shows the same mastery in dealing with a great accumulation of data. Unity is given to the treatment by regarding the economic spirit of America (the United States) as the outcome of the development of the Puritan spirit in "new lands," that is, lands awaiting development by modern methods. The author finds a large measure of uniformity in the people and their economic outlook due to the fact that the settlement of the western tracts proceeded primarily from the already Americanized areas of the east. At first the south presented marked distinguishing features based largely on differences of climate, allowing of the production of valuable commercial commodities by cheap, originally slave, labour; but in the end the spirit of the north, particularly as modified in the west, where all the conditions favoured the untrammelled development of capitalism, has triumphed over the south, more especially since the south has become industrialized. The Puritan element in the formation of the American spirit is revealed in the attitude of the people to money and work (p. 27). As everybody knows, the dollar is always in their mouths, but money is not esteemed for itself or even for its purchasing power, but as a sign of an efficient active life. Not the possession but the earning of money is what is held in regard (pp. 48–49). Envy is not an American vice. It is the fight that is admired; failure is regretted and the defeated is willingly aided in his attempts to rise (pp. 70–72). The process of conquering a raw country is of course unfavourable to the growth of culture; but so long as the American felt that he had plenty of room he did not see this defect; he looked out on the world with an almost childish optimism, feeling that in every respect he was at the height of civilization. But the filling up of his land is bringing about a change in this as in many other aspects. There is growing up, as is pointed out in the last chapter of this study entitled "Das Erwachen einer Kulturkritik," a spirit of self-criticism which finds expression in such books as 'Babbitt' and 'Main Street,' by Sinclair Lewis, and a composite work by thirty authors entitled 'Civilization in the United States,' reviewing every department of American life and showing that the pretended superiority of the United States does not exist, but that, on the contrary, American culture is in an embryonic state (pp. 109–115). G. G. C.

South America: an Economic and Regional Geography, with an historical chapter.— E. W. Shanahan. London: Methuen & Co. 1927. 9 × 6, pp. xiv. + 318. *Maps and Diagrams.* 14*s. net.*

This is a book of considerable importance, as supplying the first moderately advanced account of the regional and economic development of South America from the geographical point of view; and it is a distinct merit that this viewpoint is maintained both positively by insistence upon the physical environment, and negatively by the rejection of matter irrelevant to geographical discussion.

However, while the book contains little which is not within the scope of geography, we feel that the author has sometimes failed to bring out the full significance of his physical descriptions. Thus, although a distinction is drawn, both geologically and physiographically, between the Pampean and Pre-Cordilleran ranges of Argentine, the bearing of this is not made apparent in the ensuing outline of human activities. Similarly, although the account of the relief and drainage of the Central Mineral Region of Brazil implies certain controls of communication, these are not mentioned—a serious fault in a book with an avowed educational aim. At the same time, there are innumerable instances of really valuable discussion of environmental controls among which the chapter on the Chaco Lowlands stands out as an admirable example of the careful working out of physical factors in economic development.

The writer is least happy in his chapter on the climate of South America. Here an almost complete disregard of temperature-data and an over-emphasis of one aspect of rainfall—its seasonal distribution—has led to the determination of such curious *climatic* provinces as the "Interior Summer Rainfall Region," which embraces, with disturbing impartiality, such varied items as: the lines of 3° and 40° S. latitude, the isotherms of 50° and 80° for July, the annual isohyets of 30 in. and 80 in., and the areas of production of cacao, sugar, and oats! This is an extreme example, but hardly more defensible is the inclusion of Western Peru and Tierra del Fuego in another of these regions on the grounds of aridity.

Of the fifty maps and diagrams in the book, it is surprising, in consideration of the sub-title, to find that only five are devoted to statistical representation of economic production. It should have been possible to replace the six elementary relief maps, which show little more than a good atlas map, by these. A serious defect of all the maps but one is the lack of any indication of scale.

In spite of the foregoing criticism, this is a most useful survey of the outstanding features of the economic and regional geography of South America. While the individual chapters may vary—generally in accordance with the value of the material at the author's disposal—it can be said that most of them are marked by a real grasp of essentials. Quite two-thirds of the book are devoted to regional studies, and, although this may seem an undue proportion in a text-book of economic geography, it is perhaps justified by the strong regional contrasts in the continent; while the risk of failure to give a coherent idea of the whole, entailed in such a method, is removed by the author's gift for rapid summary, so well seen in four chapters devoted respectively to Historical development, Tropical agriculture, Andean minerals, and General economic conditions. Brief as these are, they go far to provide a general background for more particular treatment under regional divisions. H. A. M.

Peopling the Argentine Pampa.— Mark Jefferson. American Geographical Society, Research Series No. 16. New York: 1926. 8½ × 5½, pp. vi. +211. *Maps and Illustrations.* $4.

The gaucho, that modern and apparently short-lived reversion to the primitive Aryan pastoralists of Central Eurasia, casts a romantic glamour over the history of Argentine development. In this volume he is given his full share of attention, and the economic stratum to which he belongs, namely, the "creole" or long-settled land-owning population of the country, is shown to us in a full-length portrait where minute attention is devoted to the indication of character and the exhibition of detail. The book, however, does much more than delineate this fundamental Argentine type. It is a systematic account of all the various processes through which the agricultural and pastoral population of the central section of Argentina has been, and is being, built up; further, it describes the various elements in that population with a judicious selection of material and an intimate touch derived from first-hand knowledge and personal observation; so that the reader gains convincing impressions not only of the people themselves, but of the varying milieu in which their struggle has been waged.

The purpose of the book is mainly to describe the manner in which colonies of farming folk became established in various parts of Santa Fé and the neighbouring provinces in districts that had previously been in a state of nature or were roamed over by herds of semi-wild cattle. Much space is therefore rightly devoted to the history and the development of various representative groups of these colonies. This kind of writing is apt to become tedious, but

Mr. Jefferson has shown admirable skill in telling the story of each group with vividness and freshness. His style is dignified and lucid, and he knows how to choose his quotations so as to serve the double purpose of illustrating his points and of adding scholarship to his work. The central theme is kept steadily in view throughout, and thus in the concluding chapter the author is led to a general survey of immigration into Argentina and of its value past and present as an asset. One gathers that Mr. Jefferson is broad-minded enough to be free from any taint of nationalist partisanship. The English reader in particular will naturally be gratified to find that when time and again the work of the British in Argentina is mentioned, an ungrudging tribute is paid to the importance of their contribution to the country's development in the building of railways and in other directions, and to learn that the English " gringos " of the early days have succeeded in setting social fashions in various ways for the *élite* Argentinos of to-day. E. W. S.

AUSTRALASIA AND PACIFIC

The Long Lead : Across Australia by Motor Car.— M. H. Ellis. London : T. Fisher Unwin, Ltd. (Ernest Benn, Ltd.). 1927. 8¾ × 5¾, pp. xii. + 280. *Numerous Illustrations.* 12*s.* 6*d. net.*

Through a Land of Promise : with Gun, Car, and Camera in the Heart of Northern Australia.— Michael Terry. With Introduction by **H. W. Gepp,** Chairman of the Commonwealth of Australia Development and Migration Commission. London : Herbert Jenkins, Ltd. 1927. 8¾ × 5½, pp. 336. *Numerous Illustrations and a Map.* 18*s. net.*

The Northern Territory of Australia is a vast area of over 500,000 square miles which, although first settled in 1828, still carries less than 3000 white inhabitants. Both these books describe long and adventurous expeditions by motor, the object of which was to examine the possibilities of the Territory's development.

Mr. M. H. Ellis's expedition, undertaken with two companions in 1924, was the first to cross Australia by car from Sydney to Port Darwin and back—a distance of over 6000 miles. It was organized by a powerful group of Australian newspapers, headed by the Sydney *Daily Telegraph*, and by the Australian Meat Council, Mr. Ellis acting as Special Commissioner. The car used was a 14-h.p. standard Bean 1924 model, with reinforced springs, and the whole of the equipment was British or Australian made.

Mr. Michael Terry's expedition, organized in the following year, was also Empire-equipped ; it was larger than that of Mr. Ellis, with a *personnel* of six and two 1-ton model Guy-Roadless trucks, trailers for spare fuel, and a 40-gallon water tank for each car. Extra supplies were sent on by pack-camel teams to three advanced points. Instruments, including hypsometrical apparatus to determine heights above sea-level, were supplied by the Royal Geographical Society, which also awarded Mr. Terry the Cuthbert Peek Grant. Mr. Terry made his starting point Port Darwin, but instead of going due south he went inland for 500 miles towards Newcastle Waters, then turned westward and crossed the basin of the Victoria River, thence over the Antrim Plateau, down Sturt Creek and into the sand plains of the remoter and unoccupied interior and so to Broome. A preliminary account of the expedition appeared in this journal for October last.

Both expeditions reached their destinations without serious mishap. The conclusions to be drawn from them are that at present Northern Australia is a land for the financier rather than for the pioneer of small means, and that it

will be half a century before it can be thought of except as an area of large pastoral holdings. O. R.

MATHEMATICAL AND PHYSICAL GEOGRAPHY

Stories in Stone.— **Willis T. Lee.** London: Chapman and Hall, Ltd. 1926. $9\frac{1}{4} \times 5\frac{3}{4}$, pp. xii. + 226. *Forty-nine Plates and Three Figures.* 15*s. net.*

This volume is one of the Library of Modern Sciences. It is not designed for the specialist but for the general reader—perhaps even more for young readers. It is most interesting and instructive throughout, and should appeal to many people. The plates are particularly good; many of them are aeroplane photographs of rather inaccessible places. The importance of the aeroplane is insisted upon in one whole chapter, and some of the less obvious values of aeroplane work in surveying are noted as well as the better-known uses.

For the most part the scenes pictured are taken from the arid Western Plateaux of the United States. A beginning is made with the Colorado Canyon, which is described not only from the scenic point of view, but also stratigraphically. The several unconformities shown in the walls of the canyon are simply explained so as to appeal to any reader. The treatment all through the book is chronological. The author chooses some feature or group of features of particular interest which occur in rocks of a certain period. He describes and accounts for these features and then adds a brief explanation of the conditions prevailing during the formation of rocks in which the features are found. In this way physiography and stratigraphy are treated side by side.

Amongst other matters we find descriptions of the scenic features of the Great National Parks of the United States; the Mesozoic giant reptiles; the mammoth cave of Kentucky and some New Mexican caves; fossils and their uses; petrified forests; natural bridges; and many other interesting things. The treatment is lucid and, so far as the intent of the book permits, thorough.

As the book is intended for the general reader photographs are indispensable. The author has chosen an admirable series, and they are all well reproduced. The fact that many of them are taken from the air renders them of additional interest and value. It is no disparagement to the author to say that they form one of the best features of the book.

The closing chapters of the volume deal with rather different matters. The author recounts some of the early legends of the Creation, and then devotes an entire chapter to an account of the Nebular and Planitesimal theories of the Solar System. The final chapter is entitled "Facts, Fancies and Nebulous Thoughts." It gives a short but interesting account of the History of Geology. It is based primarily on Sir A. Geikie's book, but fills a useful purpose here in drawing the attention of the general reader to some of the main stages in the development of geological ideas.

The volume was put in type after the death of the author, in June 1926. This probably accounts for occasional disagreements of the text with the numbering of the plates.

Although the scenes described are entirely American and the stratigraphical divisions often bear local and rather unfamiliar names, the book should appeal to many English readers. The Colorado Canyon, the Yosemite Valley, and the "Wild West" are so well known that they need no introduction to Englishmen. J. A. S.

Lehrbuch der Geophysik.— Herausgegeben von Dr. B. Gutenberg. Lief. 1. Berlin: Gebrüder Borntraeger. 1926. 10½ × 7, pp. 176; figs. 52. *G.M.*9.75.

One of the more noteworthy of the numerous books on geological and geophysical subjects now being issued by the enterprising Gebrüder Borntraeger is a text-book of geophysics by various authorities under the general editorship of Dr. B. Gutenberg. Of the five instalments to be published three have already appeared, but only the first is so far available for review. This part is mainly written by Prof. A. Born, and covers a wide field which is treated quantitatively wherever possible. After a brief *Introduction* by Dr. Gutenberg, Prof. Born deals with the following topics: *Section* 1: The origin and evolution of the Earth; the composition and properties of minerals and rocks; meteorites; geochemistry; geological time; and the structural elements of the crust. *Section* 3: The mechanism of epeirogenic and orogenic movements. *Section* 4: The work of erosion by water, ice, and wind. *Section* 5: The manifestations, distribution, structural types and causes of vulcanism. Prof. E. A. Ansel is responsible for *Section* 2, which is devoted to gravity and isostasy; and in the first two chapters of *Section* 6 Prof. A. Sieberg writes on the fundamental ideas of seismology and the frequency and intensities of earthquakes. The remaining chapters of this valuable account of earthquake geology is carried over to the second instalment.

It will be clear from the above summary that Part I. of the *Lehrbuch* is of very great geological and geographical importance. It is thoroughly up to date, full of stimulating ideas, well illustrated, and written in a style which is generally clear and straightforward. Discussion of the work as a whole must necessarily be deferred for the present, but the first part undoubtedly gives promise of a well-proportioned and authoritative treatise by distinguished men who have themselves contributed and are still adding to the rapidly advancing subject of geophysics.

HUMAN AND HISTORICAL GEOGRAPHY

Travel and Travellers of the Middle Ages.— Edited by **A. P. Newton.** (The History of Civilization.) London: Kegan Paul. 1926. 9 × 6, pp. vi. + 223. *Illustrations.* 12*s.* 6*d. net.*

The contributor of the sixth chapter to this co-operative survey touches upon the question of what travel is and what it is not. Such a discussion might well have come earlier. The book opens, it is true, with a general discussion by the editor, but this deals almost entirely with broad geographical conceptions and their development. These are certainly important, but how far were the travellers discussed later concerned with these somewhat "arm-chair" details? Throughout there seems to be some indecision, or even difference of opinion, on this point—the need for treating also of matters of history, geographic theory, and economics. The Vikings, dealt with by Prof. Mawer, brought the North American coast-line into the area of knowledge, but does a consideration of their influence upon the cultural life of the British Isles necessarily enter into the scope of this work? This aspect is strongly emphasized, but their actual American voyages are described very jejunely. Might not the Normans and the Crusaders have been introduced with equal justification? Similarly in the chapter on "Communications in Eastern Europe," the chronicler of travel is rather swamped by the economic historian.

The best chapter is that by Miss Eileen Power on "The Opening of the Land Routes to Cathay." Here the general situation is ably summarized,

the conditions of travel outlined, and the travellers themselves brought to life with a sure touch. In the Middle Ages in general travellers were confined to the limits of one sovereignty, usually Christendom or the world of Islam. For an interval circumstances opened a wider sphere to Western travellers—as Pegolotti's 'Guide Book' states briefly but significantly, "The road you travel from Tana (Azov) to Cathay is perfectly safe whether by day or night, according to what merchants say who have used it"—and of this the great work of Marco Polo was the fruit. Other points of interest to the general reader brought out elsewhere are the conception of the Arab as the heir of the Roman Empire, and the existence of an Arab trade in the furs of Scandinavia, though on the latter point Baron Meyendorff disagrees with Prof. Mawer. That a through route in goods does not necessarily connote a through route for travellers is brought out by the Baron in describing conditions on the Volga, with its freebooters subsisting on "blackmail, fluctuating between tribute for keeping quiet and wages for troubling some third party."

The tangled history of Prester John, little known to the general reader, is here recounted by Sir E. Denison Ross. When the whole is reviewed, perhaps the chief criticism is to be levelled at the title, which is hardly adequate to a work which really deals, even if somewhat disjointedly, with the ideals and achievements of mediæval geographers. The one sketch-map in the volume illustrates the routes to Cathay. G. R. C.

Von Ratselhaften Ländern.— Richard Hennig. München: Delphin Verlag. 1925. 8 × 5½, pp. 326. *Illustrations.* 10*s.*

In this book of puzzles in historical geography it is at first difficult to see the connection between the several chapters, but it shortly appears that its object is to show that it is possible to extend our knowledge of ancient travel and traffic beyond the Mediterranean area, to include, for example, a considerable portion of the east coast of Africa, the East Indian Archipelago, and the coasts of China. The author also sets forth a connection, at the least an involuntary one, between Eastern Asia and America from very early times, while the second half of his book is devoted to proving the achievement of the "discovery" of America on at least ten occasions before Columbus' voyage.

An early chapter is a very thorough examination of the situation of the "Thule" of Pytheas. Dismissing conjectural etymology, the author bases his argument on two main points, one, that the acceptable astronomical evidence places Thule in the neighbourhood of 64° 30′ N., and second, that there was a considerable commerce between the British Isles and Thule. The first rules out Iceland; the second, he thinks, the Orkneys, since they could not have been sufficiently attractive. He therefore concludes that Thule was on the coast of Norway, most probably near Trondhjem. If Pytheas' vessels were able to accomplish this voyage—for he believes that the Greeks did visit Thule—and if Pliny's remarks on trade refer to that with Thule and not to the islands in general, this identification (which incidentally is not new) is reasonable. At the other extremity of the ancient world, Dr. Hennig, from references in Chinese annals to voyages to the western shores of the Indian Ocean, considers that the well-known "Periplus of the Erythræan Sea" must be regarded not as a record of a pioneer voyage but as the description of an already existing commercial route by Hellenic new-comers. The "sweet reasonableness" of his method is also shown in his treatment of the Ophir problem. He refuses to see in the Zimbabwe ruins the traces of King Solomon's emissaries, though

he places Ophir on the Sofala coast; the expedition thither was really a combined Israelitish–Phœnician piratical raid upon a rich *entrepôt* city—not in Arabia, since that would stultify the references to the Queen of Sheba.

When he turns to America he seems to exercise less restraint in his conjectures, though he does hold that classical references to a western continent were probably theoretical deductions, that "the ancients did not discover America, but invented it." Again, though Fusang of the Chinese annals probably was not America, he thinks sufficient crews were carried across the Pacific to influence very widely and very profoundly the pre-Columbian cultures. He also refers to reports of classical finds on American soil, but says nothing of elephants. In dealing with the Norse voyages to Wineland he is on somewhat surer ground. He brings the explorers as far south as possible, a hypothesis supported by recent theories on the recorded observations of the sun. He then argues that the voyages of the Sagas were not the earliest, and introduces the shadowy "Hvitramannaland" mentioned therein, which is not definitely connected with Wineland. Upon this, and on the strength of its alternative name "Great Ireland," a statement that Iceland was discovered by Irishmen from the west, the existence of possible Christian symbols in Mayan art, and Shawan traditions recorded in 1819, he builds up a Christian Irish colony in the south-east of North America. There is space here only to mention his acceptance of the genuineness of the Zeno voyage upon internal evidence, and of the Corte Real-Scolvus voyage of 1472. Whatever the value of its conclusions the book makes interesting reading, and it is a pity that the numerous bibliographical references are not more systematically arranged.

G. R. C.

Guide Encyclopédique commercial et administratif d'Alexandrie et du Levant, Egypt. Soudan, Palestine, Syrie, 1926–7.— E. Nicohosoff. Alexandria: Etablissements Typographiques C. Molco et Cie. 11½ × 8. pp. 670.

This volume is in truth an "encyclopædic guide"—encyclopædic in the amount and variety of the matter it includes, and a real guide-book for the tourist and traveller since it contains such information as may be of constant use—lists of streets, tables of distances, means and costs of travelling in the areas concerned, comparative tables of money values, to give only a few examples.

As the title indicates, it is divided into five main sections: Alexandria, Egypt, Sudan, Palestine, and Syria. Each section gives a short topographic account, and subdivisions dealing with details of administrative government, of the public services, etc. Incidentally the book contains, mainly in tabular form, a good deal of matter of direct interest to the economic geographer, and such as is not always directly available otherwise. Thus, the section on Alexandria gives tables of cotton exports, the destination of the exported goods, and methods of distribution; that on Egypt gives details as to the import, export, and re-export trade; that on the Sudan, data as to the area, yield, and harvesting of the chief crops, and the means of local transport. There are also details as to irrigation schemes and prospects, sea and river port conditions, and the movements of shipping.

A great practical disadvantage, however, is due to the somewhat awkward size and the very great weight of the book. Indexed edges and parallel glossaries in several languages of trade and other terms, on the other hand, add to the ease of reference.

B. H.

THE MONTHLY RECORD

EUROPE

Essex River Names.

We are indebted to Mr. Miller Christy for a reprint from the *Essex Naturalist* (vol. 21) of a paper on "Essex Rivers and their Names," with a map of the rivers and their basins. It is pointed out that the rivers of Essex are very numerous (no doubt in great measure a result of the large area of clay surface), that five of the more important all rise within an extremely small area near the north-west extremity of the county, that all except the Cam flow either south or east into the Thames or North Sea, and that only one-seventh of the 175 odd miles of county boundary is not marked by a river or the sea. A large proportion of the smaller streams are either nameless or have a mere descriptive epithet referring to some landowner, farm, or parish in their vicinity. A few names of such, with the *ey* termination (signifying "island," as in "Wallasey," "Mersea," etc.) may be due to the existence of islands at their confluence with the larger rivers. In general the study of the river-names is rendered difficult by the scarcity of really ancient records in which they are mentioned. Very few seem to be the true original names, but most are probably "back-formations"—recently invented names derived either from some important ford, or from some place named originally from the forgotten early name of the river. Some twenty-two Essex rivers have definite names of a sort, bogus or genuine. Mr. Christy concludes that more than half of these twenty-two river-names are mere back-formations. Seven (Stort, Ching, Mardyke, Roch, Can, Wid, and Brain) are ill-conceived popular inventions of fairly recent date. At least seven more (Roding, Bourne or Bearn, Chelmer, Ter, Roman River, Bourne, and Slade), though also comparatively modern, are older and of more natural origin. This leaves no more than eight Essex rivers (Thames, Lea, Ingrebourne, Crouch, Pant or Blackwater, Colne, Stour, and Cam) the names of which can be regarded as genuinely ancient and *bonâ fide*. (It may be noted that most of these latter eight are important waterways.) The name "Blackwater," it appears, was not derived from Old English *blæc*, black, but from *blác*, meaning bright or clear. Other English estuarine rivers with this name occur in the Isle of Wight, Hampshire, Derbyshire, and Worcestershire, whilst the numerous Scottish and Irish cases suggest derivation from some Keltic root. It is perhaps not very remarkable that so many of the innumerable brooks of Essex, one very much like another, should never have had real names. As Mr. Christy remarks, it is constantly found that streams receive totally different names from the dwellers on different parts of their courses.

Development of Lorient-Kéroman.

A study of the new fishing port of Lorient by C. Robert-Muller appears in the *Annales de Géographie* for May 1927. Three factors have led to the rapid development of the fishing industry in this Breton centre: the existence of a return freight for colliers in the shape of pit props for the English mines, a deep-water harbour, and the adoption of trawling. The amount of coal required by the trawlers is large: one large steam trawler will consume on an average 1500 tons per annum. The fishing industry of Lorient requires in all from 60,000 to 70,000 tons per annum, a third of the total coal import. The port is also favourably placed with regard to the fishing grounds, particularly for the "Great Sole." The chief catch is hake. The average absence of the trawlers from port is ten days, as compared with fifteen days for the

Rochelle boats. The growth of trawling at Lorient rather than on the Channel coast of Brittany is due to the predominance there of the cod fishing. Steam trawlers were first introduced at Lorient in 1898, and now number fifty-one. Their important rôle is shown by the fact that, in the districts of Lorient and Groix, one-third of the total catch is landed from steam trawlers, though they comprise only one-tenth of the tonnage. In addition to the steam trawlers, the railway organization has contributed to make Lorient, after Boulogne and La Rochelle, the third fishing port of France. Special trains carry the fish to Paris in twelve and a half hours, and by an elaborate organization numerous centres, approximately west of the line Paris–Nevers–Bordeaux, are supplied before 9 a.m. on the day following the landing. The area supplied extends across Central France to the Mediterranean coast, Switzerland, and even Italy, supplies reaching Turin for the morning market of the third day. Recognizing the advantages now possessed by Lorient, the French Government in 1920 began to build a port adjacent to Lorient at Kéroman with all modern appliances for rapid discharge and accessible at all states of the tide. It will be possible for twenty trawlers to coal in one day. This was completed this year at a total cost of about 50 million francs. From 1922 to 1924 about 15,000 tons of fish were landed annually: this figure increased to 26,000 tons in 1925, but declined from several causes, including the English coal strike, to 22,000 tons in 1926. Under the new conditions at Lorient-Kéroman, great increase is expected.

Catalonian Cartography.

In an offprint from the *Butlletí del Centre Excursionista de Catalunya* entitled 'El Mapa de Catalunya,' the Director of the *Servei Geográfic* makes the apologia of the 1 : 100,000 map of Catalonia and gives a critical description of the sheets published up to the time of writing. The map, which is published in three editions—topographic, geological, and agronomic respectively—is intended in the first place to meet the needs of the student and tourist and of bodies responsible for public works. It is constructed accordingly, not only on a different projection (Tissot's as against the polyhedric), but on a different scale and plan from the General Map of Spain, although based in the main on data supplied by the Instituto Geográfico of Madrid, responsible for the production of the General Map, and by the General Staff.

By these departures from the practice of Madrid it is claimed, *inter alia*, that the topography can be more readily appreciated as a whole by the student of geography, and the published sheets exhibit a sufficient diversity of topographical features to enable this claim to be tested. In particular these sheets show variations of that assemblage of features so characteristic of Catalonia—the coastal massif or aligned sierra, separated from an inland neighbour either, as is more usual, by a depression covered with quaternary deposits or by a tertiary plain, as in the gently undulating Miocene of the fertile Penedès (Panadés). The foreign student will experience, however, two serious difficulties. He will be unable, short of actual purchase, to assemble for comparison the three editions of each sheet, since no library is likely to subscribe to more than one edition; yet the full value of the map is lost, as the Director states explicitly, unless the sheets are so assembled. And he will find the use of the Catalan language a serious drawback in the letterpress with which each folded geological sheet is bound up in a booklet. Surely it is time that Catalan scientific bodies were taking account of the limits imposed thus by themselves on the diffusion of their work.

There is a refreshing candour in the spirit of self-criticism in which the officers of this service have proceeded with their work; the fruits of this spirit are evident in the marked improvement between Sheet 34, the sheet of full rehearsal (*repetició general*), and its successors. The collaboration in the toponymical work of experts from the *Institut d'Estudis Catalans* is also worthy of note; by this sign and by others the production of the map is revealed as a labour born of the love of the region.

The topographical map, with contours in brown at 50 m. interval, has a ground of pale buff, which is deepened in colour on the slopes exposed to the north-west, while the reverse slopes are shaded in purplish-grey, perhaps a little heavy in tone. The town plans are admirably drawn on the black plate: the drawing of Barcelona is exceptionally good. The reproduction is of the first quality, and the Director del Servei Geográfic, Sen. Ferrer de Franganillo, must be congratulated on the production of a map which ranks high in technical achievement among the publications of the geographical institutes of Europe. R. A.

Water-levels of Lake Mälar, Sweden.

The results of an extensive series of observations on the water-levels of Lake Mälar were published last year by Folke Bergsten as Band 3, No. 9, of the *Meddelanden från Statens Meteor.-Hydrogr. Anstalt.* The form of the lake, broken up into firths and bays by numberless islands and peninsulas, gave a special interest to a study of its water-levels, and a series of stations was established in 1886, at which observations have been carried out more or less regularly ever since. Other observing stations have existed much longer —in Stockholm since 1774—and at Gravudden, a little above the head of the lake, records have been kept uninterruptedly since 1881 by the Hjälmar Canal Company. The memoir tabulates the records of twelve different stations, giving first the mean monthly levels, next the monthly maxima, and then the monthly minima, all referred to one plane of reference. The letterpress describes briefly the conditions at each station and sums up the general results as regards the mean level at the several stations for the whole period 1887–1925. While the actual levels are of course affected by barometric pressure, winds, floods, rainfall, etc., which act differently in different parts of the basin, such influences are eliminated when the means of a long period are taken. It had been held by some that, owing to the form of the basin, permanent deviations from the water-surface naturally related to the geoid might exist; but this idea has been proved erroneous. Only near the lake's union with the salt water, and at places like Gravudden and Lower Uppsala situated at a little distance up the course of tributaries, are any important differences observable. At the former the mean difference from the Upper Stockholm station amounts to 316 mm. over a total period of 383 months, but at some of the other stations it is almost negligible. One or two extreme cases of variation are noted. On 10 May 1888 the difference between Ryssgraven and Upper Stockholm amounted to as much as 121 cm., and even negative values of some size have been recorded, usually as a result of strong winds. Thus on 16 October 1890 the level at Upper Kviksund on the lake-shore was 22 cm. *higher* than that at Gravudden on the river entering its head.

Ice Conditions in the Danish Seas.

This subject is dealt with by C. I. H. Speerschneider in an official publication, with an English summary, entitled "Om Isforholdene i Danske Farvande."

(*Publikationer fra det Danske Meteorologiske Institut, Meddelelser*, Nr. 6, 1927.) In the landlocked waters around Denmark the amount and distribution of winter ice is no simple function of the severity of a season, and is greatly complicated by the sea-currents, salinity, and prevalent winds. The author studies the conditions in the various seas in the neighbourhood of Denmark, on the basis of observations commenced in 1861 and continued to date, with special attention to the period 1861–1906. In the western Baltic ice does not form easily because the water has the same consistency to a great depth, whereas in the Kattegat there is a thick salt layer below the shallow surface layer, which does not share in the convectional circulation of the latter. When ice does form in the western Baltic, it does not extend much east of Bornholm, whence the edge curves northward and southward towards the Swedish and German coasts. This ice must pass out through the Sound, and this causes ice to remain long in the latter. The Sound may freeze over in the course of a single night, and the Great and Little Belts also freeze easily, though in all these narrow seas modern steam navigation does much to hinder the formation of a continuous ice-sheet. The Kattegat may become a continuous ice-field, but more usually the ice will float to and fro under the influence of winds and currents. In the Skagerak ice from the Kattegat drifts out along the Swedish coast in a wide belt, reaching the southern coast of Norway in severe winters like that of 1893. Whereas ice on the English coast of the North Sea is unknown, except occasionally as river drift, young ice forms sometimes on the west coast of Jutland with constant easterly wind and severe frost. In 1895, another severe winter, when the whole of Denmark was barricaded by ice, there was a belt extending 15 miles off Esbjerg.

A map shows the average number of days when the main fairways in the eastern waters of Denmark have been blocked in six great ice winters of this century. The figures range from 70 in the Belts to 10 near Bornholm, and in the northern Kattegat. The average date for ice-formation in the Sound fairways is January 23, but in the winter of 1879–80—one of extreme rigour over much of Continental Europe—it appeared on December 2. The earliest date of disappearance, without reappearance later on, is January 3 in 1877.

Attention is drawn to the phenomena of bottom or anchor ice (frazil), and of what the author calls "sub-surface" ice. The latter is formed on the under-surface of a layer of comparatively fresh water, cooled almost to the freezing-point, below which is a still colder but salter, and therefore unfrozen, layer. It is observed frequently in the Kattegat. On such occasions the surface of the water may be filled with diminutive ice-needles, or the ice below may rise to the surface as "pancake" ice.

AMERICA

Dutch Exploration in Guiana.

The latter stages of the expedition under Dr. Stahel to the Wilhelmina Mountains, spoken of in the February number of the *Journal* (p. 185), are described in the *Tijdschrift* of the Netherlands Geographical Society for March and May of this year. The leader supplies a day-to-day report of his own doings from July 5 to his arrival at Paramaribo on November 24, and this is supplemented by special reports of the surveyor, geologist, zoologist, and medical officer, Dr. Stahel himself having taken the botanical work in hand. While awaiting the arrival of the surveyor, Col. Kremer, on the Lucie tributary of the Upper Corantyn, Dr. Stahel and Heer Ijzerman, the geologist, made

an interesting trip to a remarkable table mountain which had been sighted from the summits of the Wilhelmina range, separated from the latter by an extensive plain. The route thereto led at first up a branch of the Lucie, but later a way had to be made overland, through country broken by small hills. The ascent of the mountain, which is described as the Roraima of Dutch Guiana, proved extremely difficult, and would have been impossible but for the presence of a talus slope covered with bushes which offered a grip to the hands. The geologist in his report discusses the geological formation of the mountain and its surroundings, which consists of sandstone and conglomerate and accounts for the marked contrast with the rounded granite peaks of other parts of the district which it displays. The plateau at the top is quite extensive, covered with low brushwood, and, like other elevations above 1000 metres, with a thick growth of moss. Even at this altitude traces of tapir were seen. Heavy rain impeded the return, all the streams becoming swollen. After the arrival of the Colonel a rocky ridge nearer the Lucie was climbed and a complete round of bearings taken with the theodolite, the fine weather giving an extensive view all round. While the Colonel continued his surveys from the main peaks of the Wilhelmina range, Stahel and Ijzerman made their way by the Lucie to the Upper Corantyn and made preparations for the careful measurement of its discharge as compared with that of the "New" river which enters it from the south, in order to determine which branch should be considered the main head-stream. Eventually this was carried out with the help of Col. Kremer, the result being to show that on September 16–17 the New river carried decidedly more water, in the proportion of 7 to 4. Its lower course is filled with a labyrinth of islands, but the intervening channels, like most of the rivers hereabouts, are much obstructed by falls. After the departure of his other companions homewards, Dr. Stahel made an attempt to push southward towards the Amazon basin by way of the Upper Corantyn. He was now accompanied by Father Ahlbrink, who joined him with the hope of getting into touch with the Saluma Indians of these parts. They proved very shy, and when, on the river Kutari, contact was at last established, their language could hardly be understood, though apparently akin to the Carib. Want of supplies, and doubts as to the existence of a track, compelled a return, and the journey was completed in some hardship, Dr. Stahel himself being attacked by a kind of beri-beri. The expedition as a whole appears however to have been very fruitful of results.

POLAR REGIONS

The Greenland Flora.

Dr. C. H. Ostenfeld makes an important contribution to plant geography in a paper on the "Flora of Greenland and its Origin" (*Kgl. Danske Videnskabernes Selskab, Biologiske Meddelelser*, **6**, 3, 1926). He treats only of the higher plants, that is, the phanerogams and the pteridophyte class of the cryptogams, since not enough is known about the occurrence of the lower plants in the Arctic to enable the whole flora to be brought within the survey. As thus limited the flora of Greenland comprises 390 species of vascular cryptogams and phanerogams, which are given with their distribution in a general list at the end of Dr. Ostenfeld's paper. He divides the country into fifteen phyto-geographical districts, the west and east coasts being separately numbered since the whole of the interior, occupied by the inland ice, is practically devoid of vegetation.

A table shows the number of species in each district which are only found

on the west coast or only on the east coast, and the number (32) which extend from the north coast in about 83° N. lat. to the southern extremity in about 60° N. Some 60 species are found on the nunataks rising above the inland ice, suggesting that some may have survived the glacial maximum in Greenland. As would be expected, the west coast is far richer in species than the east, 134 being found only on the west as against 9 found only on the east. This is attributed to greater amount of ice-free land in the west, a more sheltered situation, a shorter distance from the nearest adjacent land, North America, and the influence of the Norse colonization in the early centuries of the present millennium, which must have greatly enriched the flora of south-western Greenland. In the north, that is the part of the country north of 76°, there are only 8 species peculiar to the area, and only 125 species in all, on account of the very severe climatic conditions. The "high arctic" species, namely those found almost exclusively in the Arctic regions, decrease in number from north to south on both coasts. The "sub-arctic" and "boreal" species, or those having their main area of distribution south of the Arctic regions, correspondingly increase, whilst the "Arctic" species—those which have their main area of distribution in the Arctic regions—have their maximum number about midway down on both coasts. The writer comes to the conclusion that 74 species are immigrants from Europe, 50 of these having been brought by the Norsemen, and that the remaining 316 probably came from America, though some 60 may have lived in Greenland prior to the maximum glaciation. As regards immigration routes special attention is drawn to Smith Sound and Kennedy Channel to the north-west, more particularly as during the post-glacial "heat maximum" this route could be followed by more southerly species than at present. There may also have been immigration from the north-east with the drift-ice of the polar current. Other aids to immigration would be wind and birds carrying seeds, etc., across the sea, especially wind sweeping seeds and portions of plants over the frozen straits in winter. It seems unnecessary to assume any post-glacial land connection either to east or west.

The Danish Survey of Greenland.

Through the courtesy of the Foreign Office, we learn that the Topographical Department of the Danish General Staff were to despatch a survey expedition to Greenland on May 25 of this year. It is under the command of Captain F. C. Jörgensen, and will be based on Disko Island. The projected programme of survey work will probably take thirty years to carry out. In addition, the expedition will supervise the construction of seismographic and wireless stations at Scoresby Sound.

HUMAN AND HISTORICAL GEOGRAPHY

History of the Prime Meridian.

The literature on this subject is somewhat scattered, and much is not easily accessible, so that the summary given by Mr. Perrin, Librarian at the Admiralty, in the April number of *The Mariner's Mirror* (vol. 13, No. 2), which has evidently entailed a considerable amount of research, is to be welcomed. As is well known, Ptolemy started his longitude numeration from the Fortunate Islands (Canaries) as the westernmost land known to him, and apart from the practice of the Arabian geographers, who made use of the mythical city of Arin, supposed to lie on the equator midway between farthest east and farthest west, Ptolemy's meridian held the field even after the horizon had been

widened by the voyages of Columbus and his successors. Innovations were introduced but slowly, but one was made in 1529 by Diego Ribero, who used as the starting-point the line of partition between the spheres of Spain and Portugal. In the latter part of the century much confusion resulted from the adoption of many different lines according to the fancy of the individual map-makers, the choice sometimes depending (as in Mercator's big map of 1569) on the supposed position of the line of no magnetic variation. The line was often drawn through one or other of the island groups of the Atlantic, with no attempt at more precise definition. Mr. Perrin is content to mention the line used in a few of the principal maps, and one or two further facts might have been referred to. No mention is made of the use of the meridian of Toledo in the map accompanying Hakluyt's translation of Peter Martyr, nor of that of the westernmost point of Africa in Wright's chart of the voyage to the Azores. This is an earlier instance of the use of a "precise geographical spot" than that quoted from Blaeu's globe of 1622 (the peak of Tenerife, much used by the Dutch in the seventeenth century).

A return to Ferro was no doubt encouraged by the decree of Louis XIII. in 1634, by which the limit of hostilities with Spain and Portugal at sea was defined. Another landmark was the report of Picard and La Hire in 1682, which discarded Ferro by reason of the uncertainty as to the interval between this and the Paris Observatory—a difficulty got over in 1725 by its arbitrary assumption as 20 degrees. For special maps it became increasingly the practice for each country to use its own starting-point, and even within the same country there was no definite rule. In England both the Lizard and St. Paul's Cathedral were used, and for maps of small areas local meridians like those of Salisbury Cathedral or Southampton. It was long before that of Greenwich was adopted, and the first instance of its use found by Mr. Perrin is in charts by Fearon and Eyes in 1738. The final adoption of Greenwich by the Washington Conference of 1884 is a matter of recent history.

Early Maps in the Vadianus Library at St. Gallen.

Dr. Hassinger of Basel gives an interesting account of the early map treasures preserved in the Vadianus Library, which have hardly yet received the attention they deserve, in the *Mitteilungen* of the Vienna Geographical Society, vol. 69, Nos. 7–9, 1926. The Swiss humanist Joachim von Watt, better known under the latinized form of his name, was, like others of his time, a man of wide culture, and geography was among the many branches of study to which he gave attention, his published works in this field including the Geography of Dionysius Afer (Vienna, 1515); an edition of Pomponius Mela with Commentary (Vienna, 1578; Basel, 1522 and 1564); an 'Epitome trium terræ partium' with world-map (Zürich, 1534); and a description of the "Oberbodensee." In 1549 he presented his whole library to the municipality of St. Gallen. Among its treasures are a finely coloured copy of the Ulm Ptolemy, and a set of simplified MS. versions of the maps, intended apparently for educational purposes, and possibly by Vadianus himself. Until lately the collection included a copy of the rare map of Erhard Etzlaub entitled "Der Romweg," but this is now in other hands.* A special rarity is a pre-

* This map was fully discussed by Dr. A. Wolkenhauer at the sixteenth German Geographentag, Nürnberg, 1907. To the eight copies known to him a ninth must now be added, preserved in the Studienbibliothek at Linz on the Danube. It has been reproduced in the collection 'Einblattdrucke des 15. Jahrhunderts' with text by G. Gugenbauer.

viously undescribed Portolan chart of the Mediterranean Region, made in the sixteenth century at Marseilles, a place not hitherto associated with early chart-making. It bears the signature "A Marseille Svivan lesaleveston . . .t Cavlet," the illegible word being presumably "fecit." The meaning seems to be that it was made by one Caulet after the pattern of a chart by Le Salevaston (or Lesale and Vaston ?). It is in good preservation and is carefully drawn and elaborately coloured. It has a rich nomenclature, and includes the area between 26° and 50° N. lat., from the Crimea to the Atlantic, with merely an indication of the south coast of England. The representation of Malta as in the possession of the Knights of St. John shows it to have been made at least after 1530, and its style points to the end of that century or the beginning of the next.

Lastly, the library possesses an item of unusual interest in a German World-map of circular form, printed from a wood-block, and coloured, by Hans Sporer of Nürnberg. This man has been known as a printer of block-books (1472), and later of books printed from movable type (among the latter being his 'Biblia pauperum' of 1475), but not as a maker of maps. The map, which has been pasted into an Ulm bible of 1480, shows a strange mixture of ancient and biblical geography with mediæval legend, and is to be regarded as a late survival of monkish learning, giving no trace of Ptolemaic influence. It bears so striking a resemblance to the map of Hans Rüst lately reproduced by L. Rosenthal of Munich (cf. *Journal*, 65, p. 469), that either one must have been copied from the other or both must have been based on a lost original. A full discussion, with facsimile, is to appear in the *Zeitschrift* of the Berlin Geographical Society.

GENERAL

Mr. Muirhead's Drawings of the East.

On view, at present, in the Exhibition Gallery at the Society's House, is an interesting selection of water-colour drawings executed by the late Mr. Lionel Muirhead in the Near and Middle East during the years 1868 to 1870. His portfolios were kindly lent to the Society by his son, Major A. J. Muirhead, of Haseley Court, near Wallingford, and a selection has been made by the President, Dr. D. G. Hogarth. Mr. Lionel Muirhead was an adventurous sketcher who pursued his art in the face of difficulties and even danger. Thus he came to obtain the unique view of the tomb-mosque of the murdered Hasein, son of the Caliph Ali, at Karbala, which is now on exhibition. It is not quite finished, the menace of a gathering mob having at last prevailed on the painter to desist. An incident of the same sort accounts also for the incompleteness of the sketch of the Klu Jarni at Diarbekr. Mr. Muirhead went up the Nile in the spring of 1868, and many of his sketches made then and there are valuable as showing monuments whose appearance has since been greatly altered. In the early summer he was in Palestine and on the Phœnician coast, and in August he reached Aleppo. Some trouble with the Turkish Government, arising out of a railway survey conducted by a band of prospectors under Col. O'Reilly, with whom Mr. Muirhead was acquainted, led to the latter's arrest and detention as a prisoner at Homs and at Hamah. On his release he returned to Aleppo and travelled about its district, paying particular attention to the Jebel Sima'n region near the Lake of Antioch, where numerous ecclesiastical remains survive. Several of his sketches of these are shown. It was not till June 1869 that he went on by way of Birejik to Urfa, where he lived in a convent

for three months. Then, in September, he travelled up to Diarbekr and a month later to Mosul. Having floated down the Tigris on a raft, he wintered in 'Iraq, where he visited not only Karbala, but also Ctesiphon. Three of his views of the "Tak" are shown. They are of particular interest as having been done before the collapse of the southern part of that great ruin. In March 1870 he set off again overland to Urfa; then made his way down to Palmyra, and finally, by way of Smyrna, reached home after more than two years' absence. A fragmentary narrative of his travels exists in MS.; but the best record is the pictorial one, of which part can be followed in the exhibition gallery. His orthography has been modified on the labels to bring it into conformity with the P.C.G.N.'s requirements.

OBITUARY

Professor Shigetaka Shiga.

THE death of Professor Shigetaka Shiga early in April deprives Japan of her most distinguished geographer and the Royal Geographical Society of an Honorary Corresponding Member elected in 1916. Professor Shiga was born at Okazaki, in the province of Mikawa, in 1863, and in 1884 graduated at the Imperial College of Agriculture at Sapporo, in Hokkaido (Yezo). A long voyage to the Southern Pacific in a naval training ship in 1884 led to the publication of a volume entitled 'Affairs in the South Seas' which acquired a wide reputation for its keenness of observation and its charming style. In days when Japanese of the upper classes were more restricted in travel than they are to-day, Professor Shiga enjoyed unusual facilities. On several occasions he was attached to Japanese cruisers on round-the-world voyages, for his writings, mainly on geographical subjects, were highly valued by the Government. He possessed administrative ability of a high order, and at various times filled posts of importance in Government service. Although at one time employed as Chief Councillor of the Foreign Office, politics were not greatly to his taste, and he found more satisfaction in such appointments as that of Director of the Forestry Bureau, and of Special Commissioner on the Sakhalin territorial division following on the cession of part to Japan after the Russo-Japanese War. For a number of years he was Professor of Geography at the famous Waseda University founded by Count Okuma in 1882.

Professor Shiga took a great interest in the activities of the Japanese Alpine Club, of which he became the second Honorary Member. He was a man of attractive personality, possessed of a delightful sense of humour, and a literary style of great distinction which led to his title of "The Japanese Ruskin" among the many admirers of the English writer in a nation of nature-worshippers.

Professor Shiga himself was personally known to few in this country, but his daughter, wife of the Japanese Consul-General, Mr. S. Yada, was some years in London. W. W.

MEETINGS: ROYAL GEOGRAPHICAL SOCIETY: SESSION 1926-1927

Thirteenth Evening Meeting, 16 May 1927.—The President in the Chair.

ELECTIONS.—Prof. Sasadhar Banerji, B.A., B.ED.; T. A. Bowden; Bailey George Brasington, B.A.; William Edward Burrows; Prof. Wilbur Greeley Burroughs, A.M.; Miss Edith Lucy Butcher; Archibald William Davis; R. B. Davison; Capt. Thomas Anton Dillon; Capt. John George Dunlop, V.D. J.P.; John William England; Mrs. Alice Garnet-Orme; H. I. Harding; Major Richard Haworth, D.S.O., M.V.O.; Harold Edwin Hurst, M.A., D.SC.; Howard Brenton MacDonald, PH.B., M.A.; William J. Morden; Prof. W. C. Lowdermilk; William Henry Powell; Lieut.-Commr. Stephen P. M. Tasker, U.S.N.R.; Capt. H. Plunket Woodgate; Arthur Philip Woollacott.

PAPER: Formosa. Mr. E. H. de Bunsen.

Fourteenth Evening Meeting, 30 May 1927.—The President in the Chair.

ELECTIONS.—John Borden; Roger Geoffrey Buckley; Capt. G. Cheetham, D.S.O., M.C., R.E.; Lieut. John Patrick Domvile; Walter J. Hawker; Robert Stewart Jenkins; Miss Florence Maud Langley; Lieut. D. A. Learmont, R.A.; Dr. Percy R. Lowe, O.B.E.; Capt. E. R. L. Peake, M.C.; Gerard Christian Pricé; Ernest Frederick Hans Sawyer, B.A.; Leonard Stanley Thornton; Lieut. J. C. T. Willis, R.E.

PAPER: Central Katanga. Mr. W. F. P. Burton.

Fifteenth Evening Meeting, 13 June 1927.—Major-General Sir Percy Cox, Vice-President, in the Chair.

ELECTIONS.—Rev. G. E. Arrowsmith, M.A.; Miss Hermine Cornelia Buysman; Lieut. Donald Robert Grant Cameron; Martin Charlesworth, M.A.; Miss Kathleen Emily Cooper; John Court Curry; Capt. Henry Vernon Cusack; Alfred Henry Darker; Hamilton Alexander Rosskeen Gibb; Prentiss N. Gray; Lieut.-Col. Sir Charles Henry Brabazon Heaton-Ellis, C.B.E.; William David Hogarth, B.A.; William Archibald MacFadyen, M.C, M.A., F.G.S.; J. F. Morris; Gerald John Pink; Lieut. Lisle Charles Dudley Ryder; John Percy Warren, B.SC.; Capt. William Wood.

PAPER: The Hydrology of the Nile. Dr. H. E. Hurst.

THE LIBYAN DES

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by

DR. JOHN BALL

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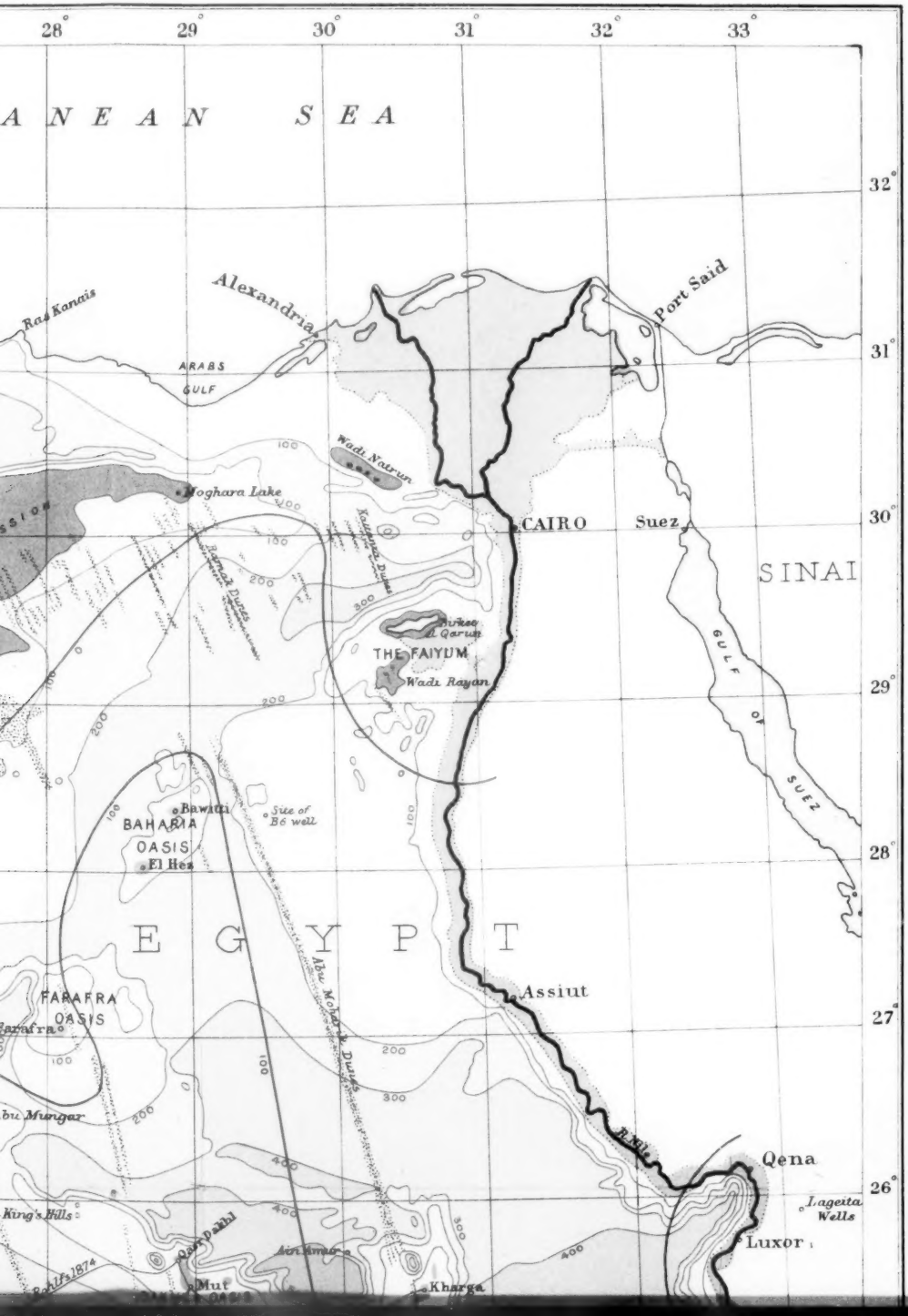
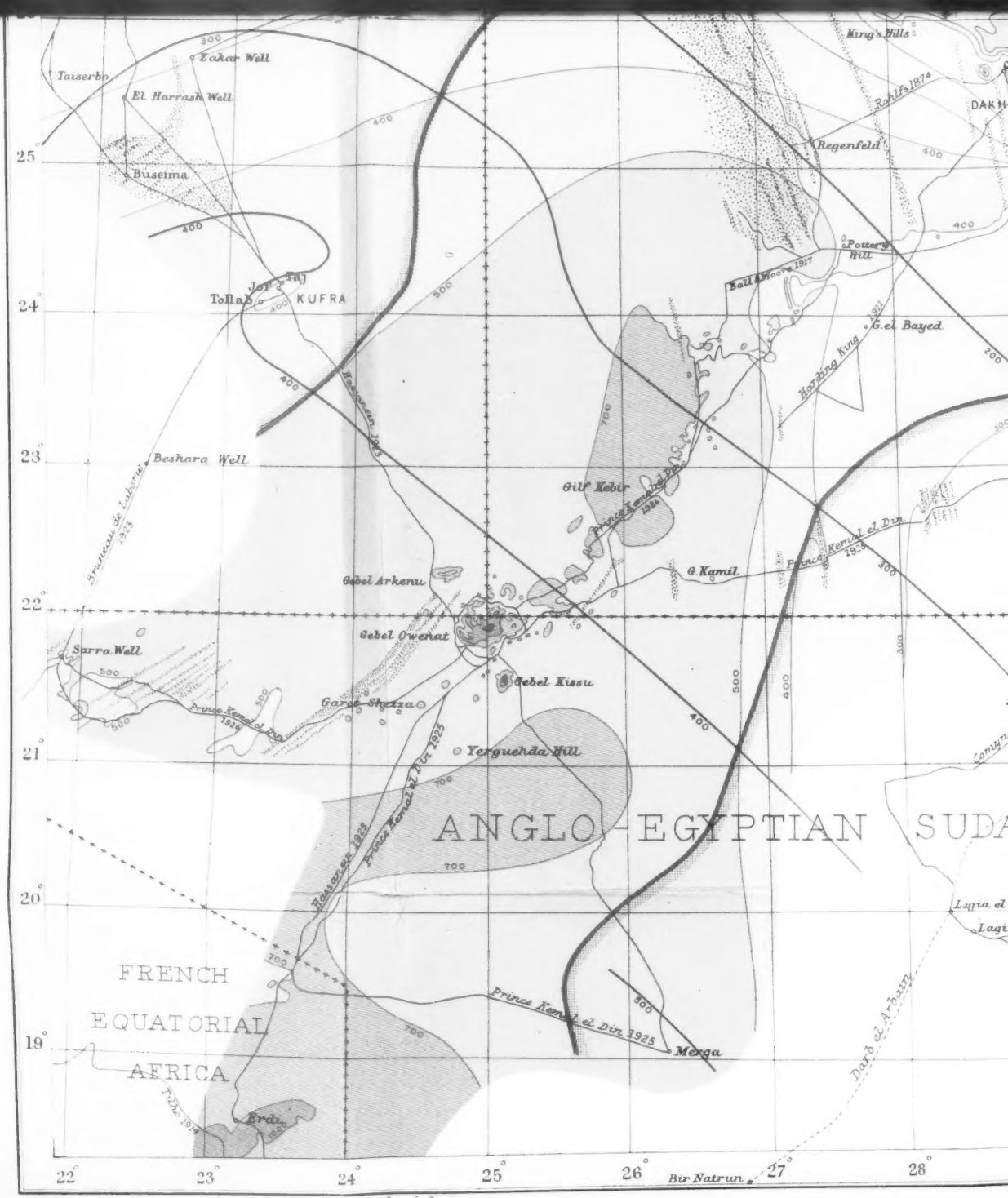
pal Exploratory Expeditions in the West and South

BALL





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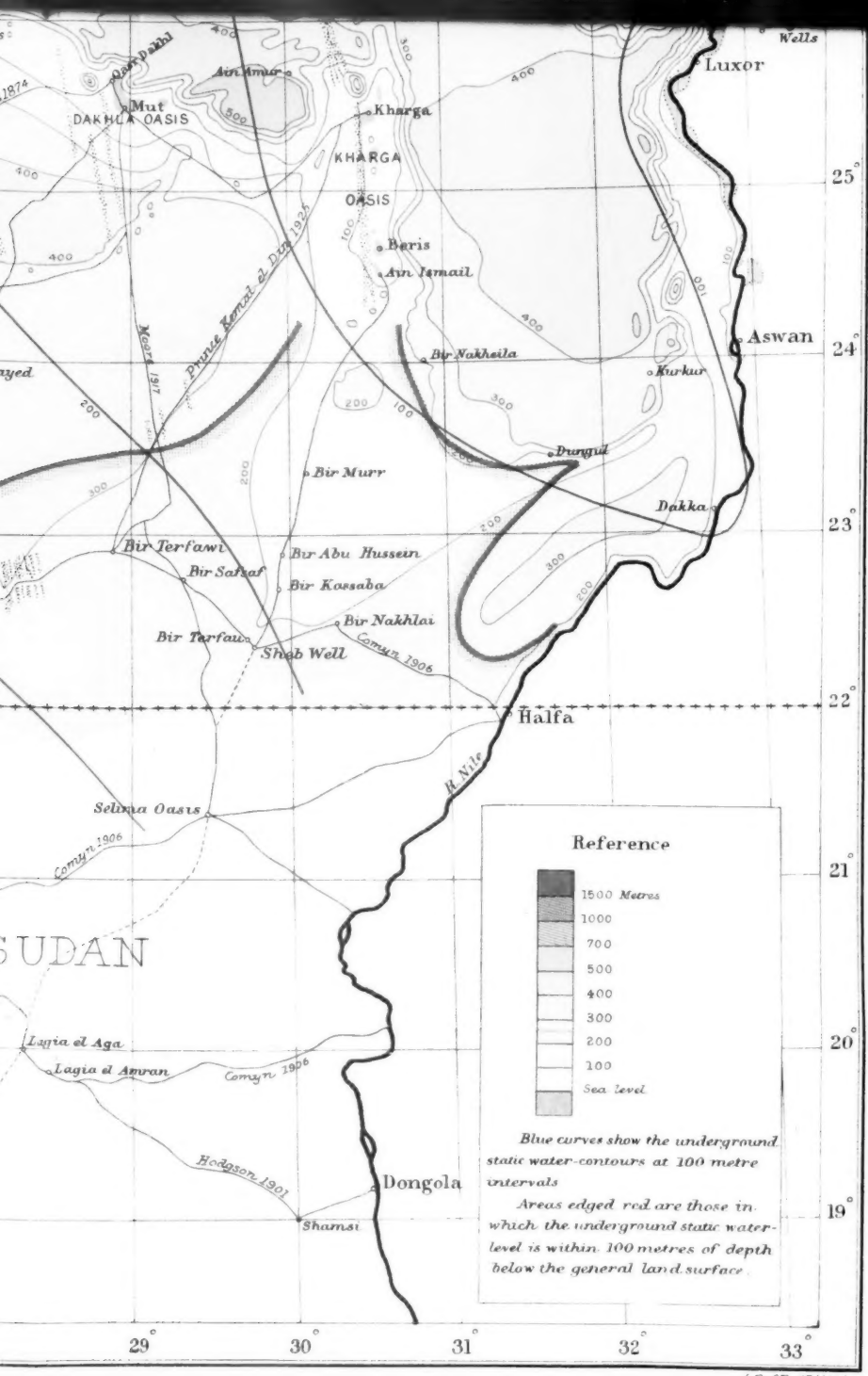

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